MARINE REVIEW.

VOL. XIV. CLEVELAND, O., JULY 9, 1896. No. 2.

Enormous Gains in Lake Superior Commerce.

The great increase of grain, coal and ore shipments to and from Lake Superior thus far this season is sufficient to explain the depressed condition of lake freights. Combined statements from the Canadian and United States canal offices at Sault Ste. Marie show that up to July 1 this season the shipments of soft coal aggregate 831,403 net tons, against only 229,757 tons on July 1, 1895, and only 59,724 tons on July 1, 1894. Wheat shipments aggregate nineteen million bushels, against six millions on July 1, 1895, and about eight millions on July 1, 1894. In the ore movement from Lake Superior there is also a large increase, the shipments to July 1 aggregating 2,931,703 net tons, against 2,540,702 net tons on July 1, 1895. The total freight movement through the canals is 1,538,587 tons greater than it was a year ago. In the following tables the full records to July 1 of each year for three years past are compared. All 1896 figures have reference to commerce of both Canadian and American canals:

MOVEMENT OF PRINCIPAL ITEMS OF FREIGHT TO AND FROM LAKE SUPERIOR.

ITEMS.	To July 1, 1896.	To July 1, 1895.	To July 1, 1894.
Coal, anthracite, net tons	136,191	81,304	187,751
Coal, bituminous, net tons	831,403	229,757	59,724
Iron ore, net tons	2,931,703	2,540,702	2,162,332
Wheat, bushels	19,101,185	6,246,961	7,736,380
Flour, barrels	1,951,565	2,682,225	2,571,620

The total movement of freight of all kinds to and from Lake Superior to July 1 is 5,437,412 net tons, against 3,898,825 net tons on July 1, 1895, or a gain of more than a million and a half tons. The various items making up these totals are shown in the following table:

REPORT OF FREIGHT AND PASSENGER TRAFFIC TO AND FROM LAKE SUPERIOR, FROM OPENING OF NAVIGATION TO JULY 1 OF EACH YEAR FOR THREE YEARS PAST.

EAST BOUND.

ITEMS.	Designation.	To July 1, 1896.	To July 1, 1895.	To July 1, 1894.
Copper	Net tons	41,271	36,180	29,822
Grain	Bushels	7,431,201		1,164,057
Building stone	Net tons	5,030	8,773	6 333
Flour	Barrels	1,951,565	2,682,225	2,571,620
Iron ore	Net tons	2,931,703	2,540,702	2,162,332
Iron, pig	Net tons	7,591	7,456	6,115
Lumber	M. ft. b.m.	227,852	223,937	212,814
Silver ore	Net tons			372
Wheat	Bushels	19,101,185	6,246,961	7,736,380
Unclassified freight	Net tons	56,261	42,131	43,118
Passengers	Number	3,747	3,434	2,765

WEST BOUND.

Coal, anthracite	Net tons	136,191	81,304	187,751
Coal, bituminous	Net tons.	831,403	229,757	59,724
Flour	Barrels	62	150	753
Grain	Bushels	1,109	18,250	500
Manufactured iron	Net tons	26,477	20,439	8,121
Salt	Barrels	82,765	90,350	64,825
Unclassified freight	Net tons	104,414	83,742	76,393
Passengers	Number	3,544	3,066	2,662

SUMMARY.

	To July 1, 1896.	To July 1, 1895.
East bound freight of all kinds, net tons	4,318,255	3,469,230
West bound freight of all kinds, net tons	1,119,157	429,595
	5,437,412	3,898,825

The total number of vessel passages to July 1, 1896, was 6,657 and the registered tonnage 6,239,140.

The Blue Book of American Shipping answers questions that arise daily in every vessel agent or owner's office. If the book is not satisfactory it costs nothing, as the $5 will be returned. Order at once, No. 409 Perry-Payne building, Cleveland.

Lakes Leading the Country in Ship Building.

Now that the work of lake ship yards during the past winter is showing up in returns to the commissioner of navigation it is found that the lakes are again leading the country in ship building. During the quarter ending June 30, there was built on the lakes sixteen steel vessels of 41,160.59 gross tons measurement, against thirteen steel vessels of only 11,524.39 gross tons built on the Atlantic coast. During this quarter no steel vessels were built on the Pacific coast or on western rivers.

SAILING AND STEAM VESSELS BUILT IN THE UNITED STATES AND OFFICIALLY NUMBERED, AS SHOWN BY THE RECORDS OF THE BUREAU OF NAVIGATION, TREASURY DEPARTMENT, DURING THE QUARTER ENDED JUNE 30, 1896.

	WOOD.				IRON.		STEEL.			
	Sail.		Steam.		Steam.		Sail.		Steam.	
	No.	Gross tons.	No.	Gross tons.	No.	Gross tons.	No.	Gross tons.	No.	Gross tons.
Atlantic and Gulf	100	10,368.43	44	6,596.33	2	236.38	1	59.84	11	11,464.55
Pacific	19	1,208.93	9	1,720.00						
Great Lakes	18	8,187.22	22	2,802.58			3	9,777.68	13	31,382.91
Western Rivers			15	3,611.70						
Total	137	19,764.58	90	14,730.61	2	236.38	4	9,837.52	24	42,847.46

SUMMARY FOR TWO QUARTERS.

	Quarter ending June 30, 1896.		Quarter ending March 31, 1896.	
	No.	Gross tons.	No.	Gross tons.
Total Sail	141	29,602.10	65	9,651.20
Total Steam	116	57,814.45	59	18,518.48
Grand Total	257	87,416.55	124	28,169.68

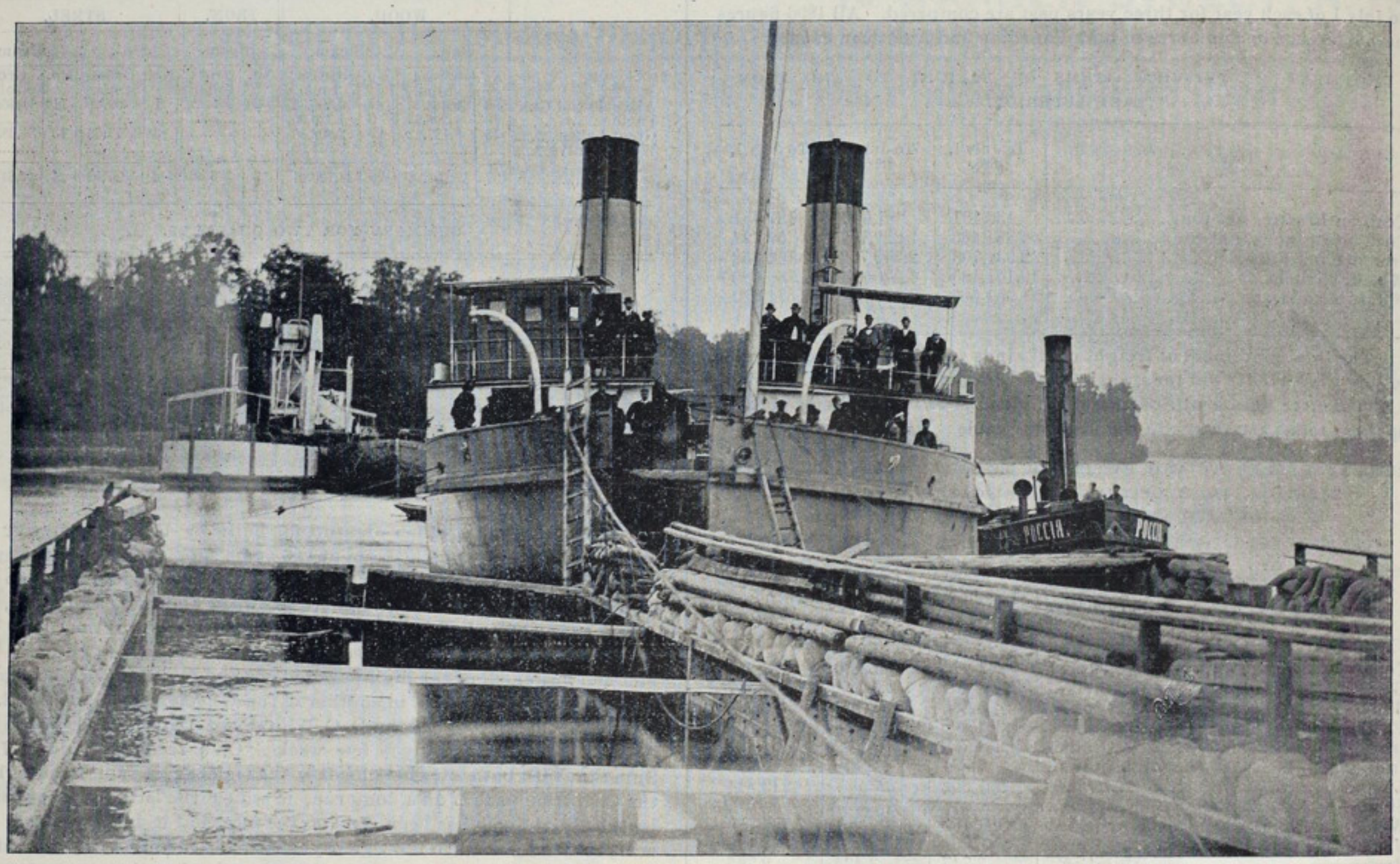
Ever since the steamer Centurion, built by F. W. Wheeler & Co., West Bay City, was launched about two years ago, she has beaten every freight steamer on the lakes excepting the fast Union liners Owego and Chemung, which are trading regularly between Chicago and Buffalo, and which have a record of better than 16 miles an hour for the entire run between these two ports. In the Lake Superior trade the Centurion has met and beaten all of the high-powered ore and grain carriers, but now it is said she has met a rival in another of the Wheeler steamers, the E. W. Oglebay, which is owned by D. C. Whitney of Detroit, and which has been in commission only a few weeks. On a recent trip down Lake Superior, with both steamers loaded, the Oglebay is said to have kept the Centurion astern on a long run, in which the latter did not gain a length. Not much has been said of the race, but it is understood that everybody interested in the Oglebay is now satisfied that she can outrun the Centurion, and a hot race may be expected when these two steamers meet again. But there is still another freight steamer in the swim now that will be prepared for a brush with either the Oglebay or Centurion whenever an opportunity presents itself. Capt. John Mitchell of Cleveland arrived home Wednesday on his new steel steamer Lagonda, which has just completed her initial trip, and he is as tickled with her as he was with the first sensation of a bicycle. There is no doubt of the Lagonda taking a place among the flyers, as she has full 30 per cent. more power than the McWilliams, another of the Mitchell ships. The Lagonda was also built by F. W. Wheeler & Co. During one short spurt on her first trip, while running light, her engines were turned over as rapidly as ninety-seven turns a minute, and both owners and builders claim that when the machinery is working smoothly, after two or three trips, she can be run to exceed 100 turns if necessary. Engines of the Centurion have on several occasions been speeded to nearly 110 turns a minute when running light.

Mr. H. F. J. Porter of Chicago, western representative of the Bethlehem Iron Co., will read a paper on "How Steel Forgings are Made," at a meeting of the Civil Engineers' Club, of Cleveland, on the evening of Tuesday, the 14th.

The Nickel Plate road sells low rate excursion tickets to Milwaukee, account the Baptist Young People's Union of America, July 14th, 15th, and 16th. Ask agents. 171-July 15.

Interesting Features in an Ice Crusher.

Through the courtesy of Mr. Frank E. Kirby of the Detroit Dry Dock Co., who designed the big ice crushing car ferries that are in service at the Straits of Mackinaw, the REVIEW obtained photographs of an ice crusher built by Sir William Armstrong & Co. of Newcastle, England, for service on the river Volga in Russia. Illustrations made from the photographs are presented herewith. The design presents some interesting features. The vessel is both too long and too deep to pass through the canal from the river Neva to the Volga. To accomplish this passage she is built in two sections, each half being a complete vessel in itself, having one side flat, or straight, which, when joined in the complete vessel, forms a center line bulkhead of double thickness. Each half has its own boiler, engine, propeller, etc. The rudder is connected to one half only. There is but one pilot house. The vessel steamed from Newcastle to St. Petersburg, where, without dry docking, the two sections were seperated by removing the athwartship bolts and plugging the holes. Each half was floated into a canal boat, which had been partly sunk for the purpose, then shored and the water pumped out, and in that shape passed through the canal. On reaching sufficient room and water, the two sections were floated out and joined together again, without dry docking.



RUSSIAN ICE CRUSHER—VIEW NO. 1, SHOWING SECTIONS SEPARATED AND READY TO BE PLACED IN CANAL BOATS.

View No. 1 shows the sections seperated and ready to be placed in the canal boats; No. 2 shows them ready for the canal trip, and No. 3 shows the complete vessel in service.

Science in Ship Building.

Not long ago Archibald Denny of the famous firm of Denny Bros., Clyde ship builders, contributed to a meeting of naval officers in this country a paper treating of the care with which his firm conducts progressive trials of new vessels on the measured mile, and referring also to the great mass of information regarding the speed of ships that is obtained from experiments with models in the tank maintained for that purpose by these Clyde builders. A casual reading of this paper shows that whatever may said of progress in our navy and in the construction of naval vessels, our merchant ship builders have much to learn from Great Britain about the science of ship building. For more than twenty years it has been the invariable custom of Denny Bros. to progressively try all vessels built at their yard. They pin their faith to measured-mile trials as the best method of obtaining the real speeds of vessels, and they have never failed in giving the speed required when the conditions were within reasonable bounds. They have up to this time given progressive measured-mile trials to some 200 vessels.

But in order to do this they have for a great many years been engaged in scientific research of a most exacting and painstaking kind. This is best explained by Mr. Denny's reference to a part of the work carried on in their tank for experiments with models of ships. He says:

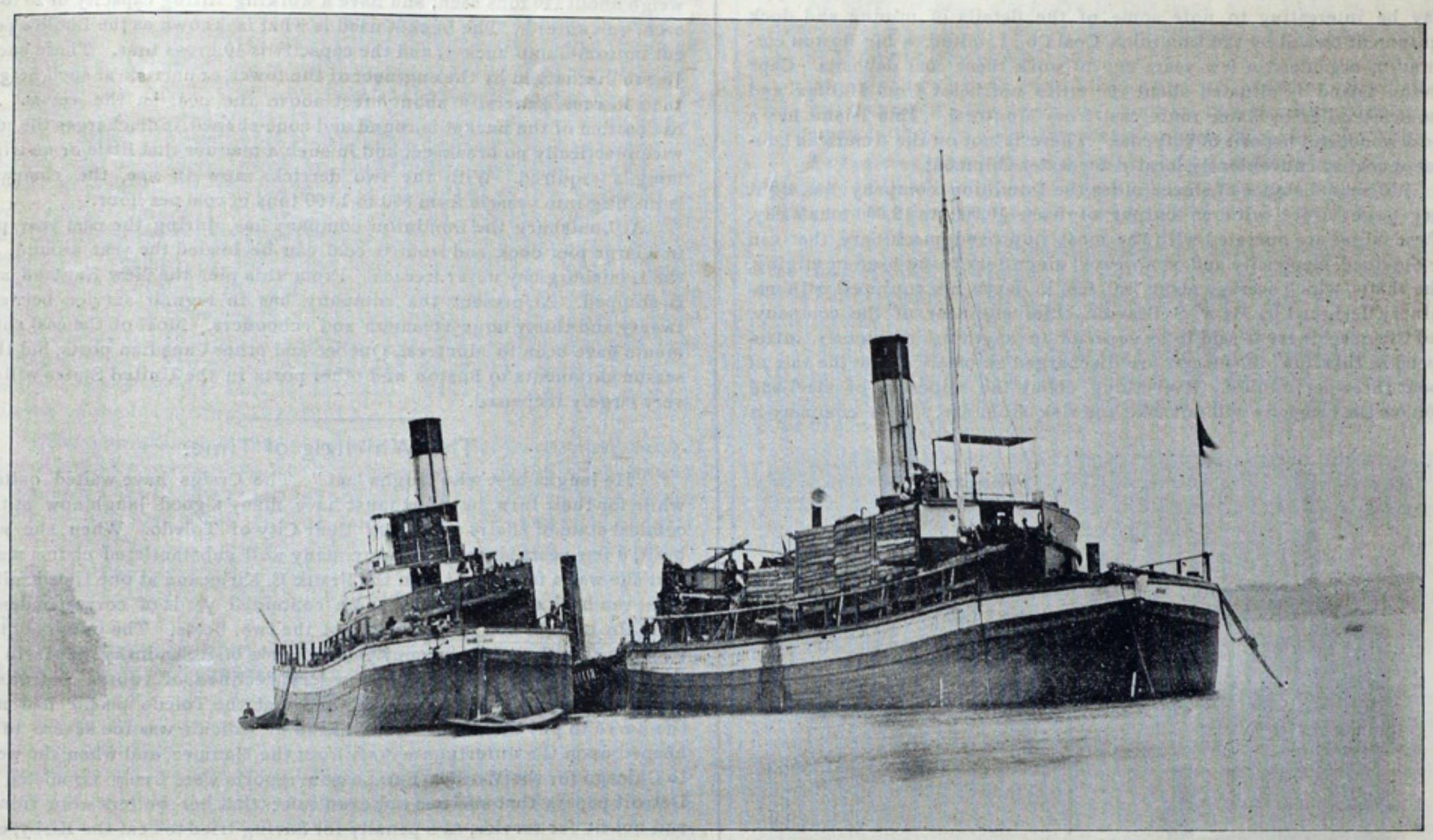
"The tank has been especially useful in the case of paddle or side wheel steamers. Had it not been for this tank we should never have constructed in 1888 the paddle steamers Princess Henriette and Princess Josephine; at least we would not have had the same assurance in taking the contract under such stringent conditions as we did. These vessels, as is well known, were only 300 feet long, and on a draft of 8 feet 6 inches the mean speed was 21.1 knots, a speed which was quite unprecedented on this length and draft in the commercial marine. Since then we have built numerous fast paddles and always with entire success. Unfortunately a monoply of such a kind is impossible, but I feel that the success of Clyde builders in fast paddle steamers is largely due to the tank. To give you an idea of the work involved by such a problem, it may be noted that before making the contract we worked for three months in the tank, and subsequent to the contract we spent other six months in the investigation of the problem. We made no fewer than twelve models for the Henriette and three pairs of wheels, all of which were tried in the tank. The total number of experiments made with these models numbered 2,262, including those with the wheels, which alone numbered 891. Of these experiments 1,573 were made before the vessel was complete, of which 555 were wheel experiments and the remainder, 1,018, were made to further investigate the problem. The first experiment we made in our tank Feb. 21, 1883, and the number now exceeds 60,000. For absolute success in fast paddles the tank is essential, if for nothing else than fixing the exact position and height of the wave in way of the paddles.

"But with all the information we have, and the facilities such information gives us for an accurate prediction of speed, we always think it wise to have at least a quarter of a knot 'up our sleeve.' Still we are not satisfied unless we get that quarter of a knot and I am sure that as we progress in our investigation we shall find less and less need for this margin of speed."

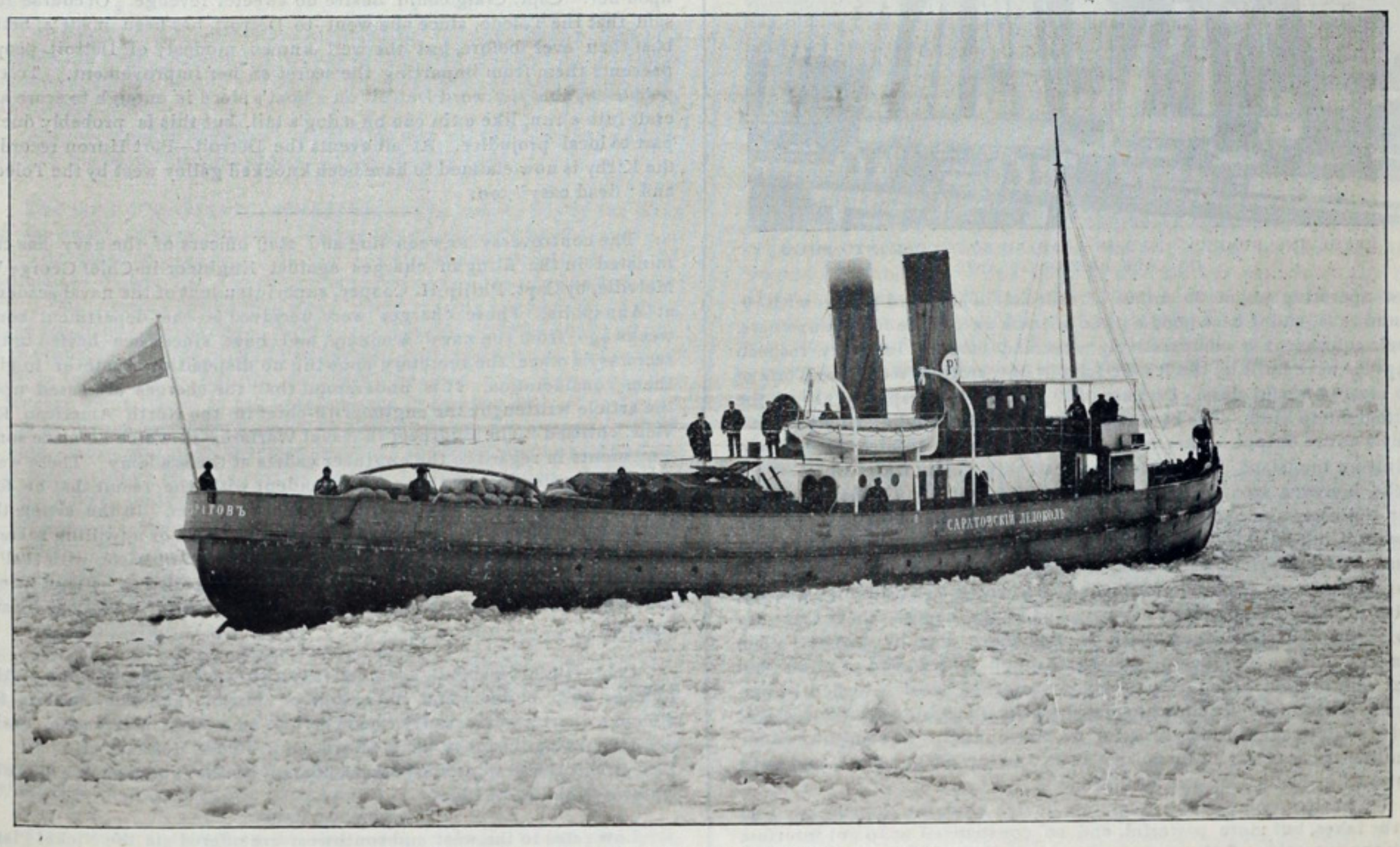
Names and addresses of 3,140 marine engineers and portraits of nearly 100 engineers are contained in the Blue Book of American Shipping. It also contains a diagram of a modern triple expansion engine with names of all parts. Special terms to engineers and other employes on lake vessels. Write the MARINE REVIEW, Cleveland.

Purchase a ticket to New York City via the Nickel Plate road and save $1.00, either first or second class. Through trains with dining cars and sleepers. 154-July 31

Ice Crushing Steamer built at Newcastle, England, for service on the River Volga in Russia.



VIEW NO. 2, SHOWING SECTIONS OF ICE CRUSHER IN CANAL BOATS READY FOR THE CANAL TRIP.

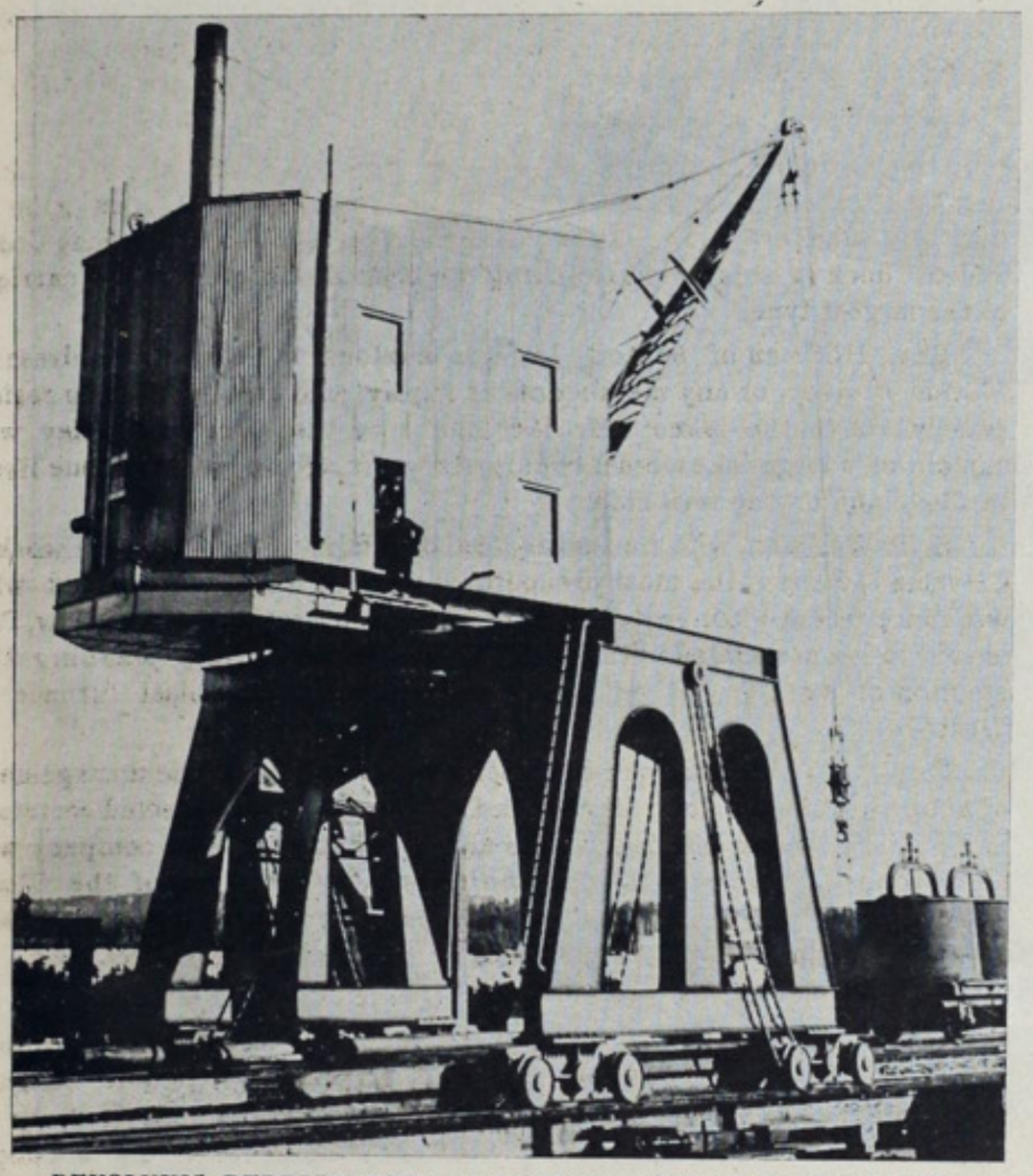


VIEW NO. 3, SHOWING THE ICE CRUSHER COMPLETE IN SERVICE.

Coal Industry of Cape Breton.

As the methods of shipping soft coal from Cape Breton island, Nova Scotia, are much the same as those that prevail on the lakes, and as Cleveland enterprise has furnished a large part of the dock machinery, it may be interesting to note some of the details of mining and dock equipment owned by the Dominion Coal Co., Limited, a big Boston corporation organized a few years ago to work these coal deposits. Cape Breton island is situated about 260 miles northeast from Halifax and about 800 miles by water route east from Montreal. This island has a most wonderful deposit of soft coal. There is not on the American continent coal so conveniently located for water shipment.

Within a distance of eleven miles the Dominion company has eight very large mines with an output of from 10,000 to 12,000 tons a day. These mines are operated with the most improved machinery that can be obtained, electricity and compressed air cutters being used in mining. The shafts, which average about 200 feet in depth, are equipped with machinery designed by Mr. F. S. Pearson, chief engineer of the company, and this machinery is said to be superior to anything previously introduced in this line. Mine cars are discharged automatically at the rate of about three per minute. Everything about the mines is of steel and iron, as the company will not take any risk from fire. This company is



REVOLVING DERRICK USED IN LOADING SOFT COAL INTO SHIPS ON CAPE BRETON ISLAND.

now operating about 35 miles of railroad of standard gauge, with 80-pound rails, and it is as good a piece of track as can be found anywhere. Their equipment is comparatively new and modern in every respect. Engines were built by the Rhode Island Locomotive Works and are of the most powerful class. Cars are of 10 and 15 tons capacity, all of the bottom dump kind. The equipment is ample to handle daily the company's entire output. They have seven pier docks located at different points on the island, from which they can ship coal. Only two of these docks, however, are used for large shipments, namely, the International pier at Sydney and the Louisburg pier. The International pier is the largest, being 1,150 feet long, about 100 feet wide and 30 feet high above water, with a depth of water alongside of from 30 to 35 feet. This pier has two tracks on each side for loaded cars, which are fed on by gravity, and after being dumped they are switched to the center, where there are two tracks that take them back to the shore, also by gravity. This pier has quite a number of chutes through which run-of-mine and slack coal is now loaded. The lump, or screened, coal is loaded by machinery with buckets, it having been practically demonstrated that coal loaded with buckets is far superior to that chuted. The machinery for handling buckets was designed by W. E. Ludlow of Cleveland, and built by the Kilby Mnfg. Co., also of Cleveland.

The machines are of the revolving derrick kind, the same as are used on the lakes, but more powerful, and so constructed as to not interfere with the operation of the two tracks underneath. The base of the machine is about 35 feet square; height from dock to top of guantry, 20 feet; to top of revolving platform, 25 feet; to top of house, 50 feet; to top of boom, 70½ feet. In revolving, the end of boom describes a circle of about 90 feet. The machines are propelled along the pier the same as is done at Cleveland and other Ohio ports. They are built entirely of metal and weigh about 140 tons each, and have a working lifting capacity of 25 tons each, guaranteed. The bucket used is what is known as the Ludlow patent bottom-dump bucket, and the capacity is 10 gross tons. These buckets are discharged by the engineer of the tower, or derrick, at such height as he desires, generally about 3 feet above the coal in the vessel. As the bottom of the bucket is round and cone-shaped, it discharges the coal with practically no breakage, and in such a manner that little or no trimming is required. With the two derricks now in use, the company is loading into vessels from 800 to 1,000 tons of coal per hour.

At Louisburg the Dominion company has, during the past year, put in a large pier dock and from it coal can be loaded the year around, as the Louisburg bay never freezes. From this pier the New England coal is shipped. At present the company has in regular service between twenty and thirty large steamers and schooners. Most of the coal shipments have been to Montreal, Quebec and other Canadian ports, but this season shipments to Boston and other ports in the United States will be very largely increased.

The Whirligig of Time.

"He laughs best who laughs last." The Craigs have waited quite a while for their turn, but they must have many a good laugh now at the comical state of affairs regarding their City of Toledo. When she was built, a few years since, there were many well substantiated claims made that she was a faster boat than the Frank E. Kirby, and at one time excitement ran high and the daily papers contained yards of correspondence from the owners and sympathizers of the two boats. The owners of the Kirby even put up a large sum in the hands of a Sandusky paper to be raced for, and when the Toledo's owners declined, of course Detroiters loudly declared that it was all off and that the Toledo people had not the nerve to put their boat in. No kind of ridicule was too severe to be heaped upon the unfortunate craft from the Maumee, and when she went to Chicago for the World's Fair season reports were freely circulated by Detroit papers that she was not even safe; that her boilers were ruined and not fit for service, as a penalty for having tried to beat the Kirby, etc. But as a matter of fact the damage to her boilers occurred when she was not racing with the Kirby at all, and did not amount to very much anyway.

But the City of Toledo has changed hands and now belongs to Detroit owners, and she has suddenly leaped into fame as being a faster boat than the Kirby, which is now only a middling good smart boat. And all this because the Toledo now hails from the same town that recently spat upon her. Capt. Craig could desire no sweeter revenge. Of course it is said that the Toledo, since she went to Detroit, has been made a better boat than ever before, but the well known modesty of Detroit people prevents them from imparting the secret of her improvement. Toledo people say that the word Detroit on a boat's stern is enough to scare any craft into a run, like a tin can on a dog's tail, but this is probably due in part to local prejudice. At all events the Detroit—Port Huron record of the Kirby is now claimed to have been knocked galley west by the Toledo, and "dead easy" too.

The controversy between line and staff officers of the navy has culminated in the filing of charges against Engineer-in-Chief George W. Melville, by Capt. Philip H. Cooper, superintendent of the naval academy at Annapolis. These charges were received at the department some weeks ago from the naval academy, and have since been buried in the secretary's office, the secretary showing no disposition whatever to give them consideration. It is understood that the charges are based upon the article written by the engineer-in-chief in the North American Review, entitled "The Engineer in Naval Warfare," in which he made some statements in regard to the engineer cadets at the academy. These were taken exception to by the superintendent with the result that he forwarded a letter to the department in regard to them. In the article the engineer-in-chief said: "Annapolis is either unable or unwilling to train naval engineers, and if its work is brought into comparison with that of other institutions, the naval academy will be compelled to extend its engineering curriculum or show cause for its existence."—Army and Navy Journal.

Capt. Hugh Chisholm, aged seventy-two years, who was one of the pioneer ship builders and navigators of Canada, and who, latterly, for almost a quarter of a century, had carried on a large mercantile, grain and forwarding business at Meaford, Ont., died Monday. He built at Port Credit the first centerboard schooner on the north shores of Lake Ontario—the Credit Chief.

Low rates to the west and southwest are offered via the Nickel Plate road, July 21st, account Homeseekers excursion. For full particulars inquire of agents. 173-July 20.

Ship Yard Matters.

A Detroit correspondent says: "Although some of the marine engine works on the Detroit river report approaching dullness, due mainly to work on new ships being cleaned up, there is still considerable doing in nearly all of the shops, and in one case an enlargement of plant is under way. The Frontier Iron Works, which recently began the manufacture of a gas engine, has found it necessary on account of this undertaking and for other reasons to increase the size of its plant by adding an upper story to the entire building from the office on Atwater street to the erecting shop on Guoin street. This addition will give more room to the brass department, which has long since outgrown its present quarters. Engines for the Merida in the erecting shop of this works are being rapidly advanced. At the Dry Dock Engine Works the machinery for the first of the Rockefeller ships is ready for shipment, and those for the second steamer are well along toward completion. Boilers for the first steamer are also ready, and it is thought at the Wyandotte ship yard that she may be launched in about two weeks. She is entirely plated and caulking is also about completed. The water bottom has also been tested and deck houses are being rivited on, so that there will not be much delay after the ship is launched. About 750 men are now employed on the two Rockefeller ships."

Official numbers and tonnage of new steam vessels reported from office of bureau of navigation, treasury department: Sir Henry Bessemer, Cleveland, 4,321.10 tons gross, 3,293.08 net, No. 116,723; Aragon, Cleveland, 1,450.09 tons gross, 1,072.28 net, No. 107,228; Enquirer, Buffalo, 140.36 tons gross, 95.45 net, No. 136,561; Andrew H. Green, Chicago, 79.-76 tons groes, 54.24 net, No. 107,229; Effie B., Ashtabula, 51.03 tons gross, 11.56 net, No. 136 558; Eleanor, Rochester, 20.25 tons gross, 13.76 net, No. 136,560.

Although the Minnesota line steamer Maricopa has been launched at South Chicago, there are still three steel barges and a steamer under way at that point. The barges include one for the Minnesota company and two for Mr. Rockefeller, and the steamer, which is not to be completed until next spring, is for A. B. Wolvin and others of Duluth. The Maricopa is 406 feet keel, 48 feet beam and 28 feet depth.

The first of the Rockefeller ships, the Sir Henry Bessemer, which leaves the ship yard of the Globe Iron Works Co., Cleveland, to-day (Thursday), on her maiden trip, was described and illustrated in the REVIEW of April 30. She will undoubtedly break all records in ore cargoes from Lake Superior.

It is claimed that F. W. Wheeler & Co., West Bay City, have eclipsed all records in the building of the steel steamer Lagonda, which is 386 by 45 by 26 feet 7 inches. The ship is said to have been delivered in eighty-seven working days from the time of putting down the keel.

Milwaukee's fire department is preparing for the construction of a wooden fire boat. Rieboldt & Wolter of Sturgeon Bay and E. W Heath of Benton Harbor, as well as two or three Milwaukee parties, are seeking the contract.

Another wooden schooner, about the size of the Melrose, will be built by the Montreal Transportation Co. of Kingston.

The party of government officials who are to make a trip up the lakes on the small steamer Amadis, leaving Cleveland July 12, will avoid, as much as possible, everything in the way of formal receptions. M. W. Bellman of Toledo has had charge of most of the arrangements for the trip. The Amadis, which is a steam yacht having quarters for quite a large company, was chartered for the trip from Mr. Kimball of Cleveland. It is probable that Mr. E. T. Chamberlain, commissioner of navigation, will be in the party, but the members otherwise are largely from the postoffice department, as indicated by the following list: Postmaster-General Wilson and Gen. Maxwell, assistant postmaster-general; Public Printer Benedict; A. W. Machen, assistant superintendent postoffice department; Judge H. L. Lorenz of Toledo; M. W. Bellman of Toledo; H. H. Baker, postmaster of Buffalo; Judge Hutchins, postmaster of Cleveland; J. J. Enright, postmaster of Detroit; M. H. Harris, postmaster of Joliet; H. W. Compton, superintendent of schools, Toledo; W. C. Lloyd, secretary United States Banking Co. and A. D. Cushing of the postal improvement company.

A pamphlet just issued by the Hydrographic office contains the rules for navigation on the great lakes (White law) and also the rules and regulations governing anchorage and movements of vessels in St. Mary's river.

"Far better than anything ever published in the same line" is the general verdict on the Blue Book of American Shipping. Price $5, Order from MARINE REVIEW, Cleveland.

Homeseekers excursion to the west and southwest July 21st. Tickets at lowest rates are on sale via the Nickel Plate road.

172-July 20.

Around the Lakes.

A raft containing 4,500,000 feet of logs, valued at $45,000, was recently towed from Spanish River to Bay City.

An advertisement elsewhere in this issue from Major M. B. Adams, light-house engineer at Detroit, calls for bids on boilers, machinery, etc. for six complete fog signals.

During the month of June 3,476 letters and packages were delivered by the Detroit marine postoffice, and the records show that but five boats passed the city which the postoffice boats did not catch.

A reward of $25 is offered by the Sandusky yacht club for recovery of the body of Charles F. Shuck, who was washed overboard from the yacht Shamrock, when about four miles east of Cedar Point, Lake Erie, on July 4.

L. P. & J. A. Smith of Cleveland have purchased from Lorain parties the small steamer Riverside and will use her for towing scows and for other work connected with dredging contracts. She will be fitted for this service.

Sound reflectors, which throw the sound of fog whistles out into the lake and thus overcome in part the cause for complaint on account the noise on shore,are rapidly being put up at different stations on the lakes. One of the latest is at Manitowoc.

On July 1 the whaleback steamer Pathfinder, towing the barge Sagamore, had completed eight round trips in the ore trade between Two Harbors and Lake Erie ports. The Pathfinder and her barge wintered in Buffalo and went into commission April 22.

On the Lehigh Valley ore dock, Tifft Farm, Buffalo, there are now two Brown hoisting and conveying rigs of three legs each, in addition to four McMyler rotary derricks. The six Brown legs are in working order and the dock is well suited to giving the best of dispatch to ore carriers of the largest type.

Rev. Hoffman of Ashton, Iowa, is anxious to learn the address of Morant Frayley, or any member of his family, who are supposed to reside somewhere on the lakes. Mr. Hoffman says that Morant Frayley was captain of a large lake vessel twenty-six years ago and at that time lived in Cleveland on the west side.

S. T. Wellman, who was at the head of affairs in the Otis steel works, Cleveland, during the most prosperous years of that concern, and who was more recently connected with the Wellman Steel Co. of Thurlow, Pa., is said to be associated with practical iron men who are planning the erection of a system of mills in connection with the blast furnace at West Duluth.

Capt. W. W. Brown, who has been very successful in the management of affairs of the Cleveland Dry, Dock Co., has again been elected secretary and manager of the company. The annual meeting of this company was held Monday. Messrs. J. F. Pankhurst and Luther Allen of the Globe Iron Works Co. are president and vice president, respectively, of this dry dock company. Other members of the board of directors are J. B. Cowle, L. C. Hanna and M. A. Hanna.

In accordance with a rule which limits the age of service to seventy years, Capt. Sullivan of Windsor, Ont., master of the transfer steamer Lansdowne, severed his connection with the Grand Trunk Railway on July 1. Windsor has been Capt. Sullivan's home since his boyhood. When only forteen years of age he was cabin boy on the brig John Dougall of Windsor. Away back in 1847 he was captain of the brig Chrispin, owned by E. W. Hudson of Detroit. Between 1847 and 1859 he commanded the schooner Alvin Clarke, brigs Mohegan, Portland and New Orleans, and Propeller Hercules, all owned in and around Detroit. For more than twenty-five years past he has been in charge of big ferries and railway transfer steamers. He has had charge of the Lansdowne, which was built at Wyandotte by the Detroit Dry Dock Co., since she came out in November, 1894.

Ten or twelve years ago, when there was considerable trading in package freight to all ports on Lake Superior, and when railways did not control this business, the steamer Samuel F. Hodge, which was totally destroyed by fire on Lake Ontario, Sunday, was a profitable boat. She was built at Detroit in 1881 for Eber Ward's Lake Superior line, and owing to her small size and light draught could reach every harbor of any importance to which shipments were made. This rendered her a valuable acquisition to the fleet and constituted her a money-maker. But with the disruptian of the Ward line came a change of ownership which sent the steamer to other and far from profitable fields. Insurance companies have of late fought shy of risks on vessels like the Hodge, and although valued at $25,000,her insurance was undoubtedly very much below that figure. She was owned by Farrell Bros. of Buffalo and was sailed by Capt. Lawrence Elliott of Detroit. The vessel's cargo consisted of 600 tons of manufactured iron, chiefly wire rods, valued at $17,000. The cargo was fully insured. Capt. John Perew, representing Smith, Davis & Co., Buffalo underwriters, has gone to the scene of the wreck and will endeavor to recover a part or all of the cargo.

MARINE REVIEW

DEVOTED TO THE LAKE MARINE AND KINDRED INTERESTS.

Published every Thursday at No. 409 Perry-Payne building, Cleveland, O. by John M. Mulrooney and F. M. Barton.

SUBSCRIPTION—$2.00 per year in advance. Single copies 10 cents each. Convenient binders sent, post paid, 75 cents. Advertising rates on application.

Entered at Cleveland Post Office as Second-class Mail Matter.

The books of the United States treasury department on June 30, 1895, contained the names of 3,342 vessels, of 1,241,459.14 gross tons register in the lake trade. The number of steam vessels of 1,000 gross tons, and over that amount, on the lakes on June 30, 1895, was 360 and their aggregate gross tonnage 643,260.40; the number of vessels of this class owned in all other parts of the country on the same date was 309 and their tonnage 652,598.72, so that half of the best steamships in all the United States are owned on the lakes. The classification of the entire lake fleet on June 30, 1895, was as follows:

Class.	Number.	Gross Tonnage.
Steam vessels	1,755	857,735.13
Sailing vessels	1,100	300,642.10
Unrigged	487	83,081.91
Total	3,342	1,241,459.14

The gross registered tonnage of vessels built on the lakes during the past five years, according to the reports of the United States commissioner of navigation, is as follows:

	Number.	Gross Tonnage.
Year ending June 30, 1891	204	111,856.45
" " " 1892	169	45,968.98
" " " 1893	175	99,271.24
" " " 1894	106	41,984.61
" " " 1895	93	36,352.70
Total	747	335,433.98

ST. MARY'S FALLS AND SUEZ CANAL TRAFFIC.

(From Official Reports of Canal Officers.)

	St. Mary's Falls Canal.			Suez Canal.		
	1895.*	1894.	1893.	1895.	1894.	1893.
No. vessel pass'ges	17,956	14,491	12,008	3,434	3,352	3,341
T'n'ge, net registd	16,806,781	13,110,366	9,849,754	8,448,383	8,039,175	7,659,068
Days of Navigat'n	231	234	219	365	365	365

* 1895 figures include traffic of Canadian canal at Sault Ste. Marie, which was about ¼ per cent. of the whole, but largely in American vessels.

EVERY TIME A race occurs between fast steamboats on the lakes or elsewhere in this country, we hear a great deal of talk about government laws against racing. Usually this argument is resorted to by the weaker fellow in the controversy, or the fellow who has been beaten and refuses to acknowledge it. As a matter of fact there is no law in the United States against steamboat racing any more than there is against a race between sailing vessels. All the officers of the steamboat inspection service in this country might be aboard two vessels that were actually known to be engaged in a race and still be powerless to prevent it or to punish the officers or owners of either vessel afterward. There is no law of the United States against the speed of vessels, excepting in fog or in canals or other narrow waterways over which the government exercises special jurisdiction. The steamboat inspection laws provide that in thick weather vessels must proceed at a moderate rate of speed, but they do not even say what this moderate rate of speed shall be. Ten or twelve miles an hour would be a moderate rate of speed for some passenger steamers, while it would be a high rate for the ordinary freight carrier. But, of course, it is well understood that the steamboat laws specify the steam pressure to be carried in the boilers of every ship of the United States that floats. In this respect the law is a safeguard against the danger of explosion due to recklessness that might accompany racing, but only when this pressure has been exceeded is the law violated. Whatever may be said about instructions from owners, or the rules of corporations owning ships, it may be taken for granted that every time there is a meeting of two steamers, between which rivalry exists, a race is sure to result and the full limit of steam will be used when it can be had. There is little danger in this full use of steam, however, as government rules for the construction and inspection of boilers make big allowances for safety.

SINCE reference was made in the last issue of the REVIEW to the possibility of Capt. J. S. Dunham being elected to the presidency of the Lake Carriers' Association at the next annual meeting, we have had three private letters on the subject. Evidently Capt. Dunham has some friends in Chicago. One vessel owner, who is known to be very friendly to Capt. Dunham, says: "I notice a very kindly mention of Capt. J. S. Dunham as a possible candidate for president of the Lake Carriers in last week's REVIEW. There was an error in it, however, which it would probably be well to correct. Capt. Dunham is not only the manager of the City of London, but he is also president and manager of the W. P. Ketcham and George B. Owen, which, as you know, are good modern carriers. He has also a slice of a large steel steamer and is the owner of five schooners, besides his tug interests. His vessel interests are certainly more extended than those of at least two men who have been at the head of the association. I write this without saying anything about it to him, merely as a matter of friendship. Personally I do not know how the captain feels about the presidency. I think that he has got his hands full as president of the Chicago River Improvement Association. If he should also be elected president of the Lake Carriers' Association, I guess he would have to hire a man to attend to his private business."

AFTER EXHAUSTIVE experiments, the bureau of steam engineering, navy department, concludes that liquid fuel is useless for war ships. Petroleum does not give as good results as ordinary coal, and in consequence it can be stated positively that this kind of fuel will not be used for spurting purposes in vessels of the United States navy, unless it be in the proposed torpedo boat destroyers, and not even then if the engineer-in-chief has his way. Reports received from the naval attaches of the United States abroad show that the European nations are abandoning the use of liquid fuel on board men-of-war. The English government is constructing a cruiser so fitted as to burn liquid fuel, but there is talk in English naval circles, according to the department's advices, that she may after all be converted into a coal burner. For the same square foot of grate surface, it has been estimated at the department that coal is greatly the superior of liquid fuel.

VESSEL masters will be interested in the following note from Duff and Gatfield, marine reporters and light tenders on the Detroit river, regarding the accident to the steamer Brazil: "The Brazil struck abreast or a little above our dock, and west of the Gross Isle ranges. Our water guage at the time was three below zero. The Brazil was drawing 16 feet 6 inches. We do not think there would be over 17 feet 6 inches of water on top of these boulders at the time she struck. The steamer Marina passed the Brazil at this point. The captain of the Brazil says his boat appeared to squat or settle just as the Marina passed him. He says the Marina drew the water from under him. However, we are pleased to note that the dredging contractors are now at work with a diver and have already gotten out a number of very large boulders from this spot. There are plenty of them yet and we trust they will get them all out a little later on."

AS WAS noted last week, there is now something more than 650,000 tons of shipping represented in the Lake Carriers' Association, but the officers of the association have their eyes on two big fleets not yet in the organization and which will very probably be brought in. These are the sixteen steel steamers and tow barges of the Bessemer Steamship Co. and nineteen big wooden ships owned by Capt. James Davidson of West Bay City. These two fleets would increase the membership of the association to a list representing a total of more than 700,000 tons. Capt. Davidson has only seventeen ships in commission at present but he has two steamers on the stocks at West Bay City. One of these will be launched in about two weeks and the other will follow a little later on. He will then have nine steamers and ten schooners or tow barges in the lake trade.

ALTHOUGH LAKE freights are now practically down to the lowest figures reached during the period of great depression in 1894, the talk of reducing wages of men aboard vessels has passed over without action, and it is not probable that a reduction will be made. The sentiment among most owners is that any reduction of expense made through a lower schedule of wages would, of necessity, be so small as to have no effect on the earnings of vessels. It is quite generally agreed that it would be far better to tie ships to the docks than to attempt a change in wages, which in some cases would not amount to more than the cost of turning over a wheel a few dozen times.

IN DEEP SEA soundings pianoforte wire plays a most important part, on account of its great strength; consequently the experiments which have been carried out during the past year to test the strength of pianoforte wire, at the Watertown arsenal, are of considerable interest. In one case a wire $\frac{1}{12}$ inch in diameter gave the enormous and extraordinary strength of 206 tons per square inch, while in larger sizes the tensile strength per square inch ranged from 135 tons and upward, the metal containing .85 per cent. of combined carbon.

The Nickel Plate road sells a ticket to Boston for $1 less than other lines. Through sleepers. 155-July 31

The Naval Contracts.

There is every reason to expect that the Cramps will make a special effort to secure a large part of the naval work authorized at the last session of congress. The big works at Newport News is very well provided with naval and merchant contracts, while the plant of the Cramps is practically idle. It is expected that the Cramps, the Newport News company, the Union Iron Works of San Francisco and probabably the Bath Iron Works will all bid on the three battleships that are to be built, while bids on the thirteen torpedo boats are also expected from these four firms, as well as the Herreshoffs, Columbian Iron Works, Crescent Ship Building Works, Dialogue & Sons and Moran Bros. The Bath Iron Works has asked for plans for all of the ships. It is reported at the navy department that Gen. Hyde, president of these works, has sent to England for the plans upon which the fast torpedo cruisers of the British navy are constructed and proposes to submit them to the department, with a bid for the construction of the vessels on their lines. The Union Iron Works some time ago prepared plans for 28-knot boats and information in Washington is to the effect that it is preparing plans for the 30-knot boats. Dialogue & Sons have asked the department to supply them with specifications for the machinery of the battleships, with a view, it is believed at the department, of making a sub-contract with the contractor for the vessels for furnishing the machinery. So far no intimation has come to the department that any bids will be made from the Mississippi river and the United States coast of the Gulf of Mexico, the laws authorizing the construction of the torpedo boats directing that, if possible, one of the boats be built in each of these localities. It is the expectation of the department officials that the secretary will have to waive this provision in the law, as he did last year, on account of the lack of bidders, and award the contract to some eastern or western firm.

Official circulars containing requirements for the three battleships have been issued. An appropriation of $3,750,000 is available for each vessel, the armament to be paid for out of a separate appropriation. As the Newport News company accepted contracts for the Kearsarge and Kentucky on a bid of $2,250,000 each, it is expected that these three vessels will each be built at the same price. Each of the new ships is to be of about 11,000 tons displacement; length on load water line, normal displacement, 368 feet; moulded breadth at load water line, 72 feet; mean draft, 23½ feet. They are to have freeboards between the 11 feet of the Indiana class and the 19 feet of the Iowa class, about 16 feet. This freeboard was recommended by the Walker board, which reported as its opinion that the Indiana was too low in the water for the operation of her guns in all kinds of weather, a criticism refuted by Capt. Evans, commanding the vessel, who says that he passed through a gale some months ago, one of the worst he has ever seen, and yet the guns of the battleship could have been operated without difficulty. Bids are invited on plans prepared by the department and on plans to be submitted by the builders.

The department's design contemplates driving the vessel by twin screws, the engines to be of the vertical triple-expansion type, two in number—one on each shaft and in two compartments. The boilers to be single-ended eight in number, and placed in four compartments. The speed to be maintained at sea for four consecutive hours is to be not less than an average of 16 knots an hour. The hull is to be of steel, not sheathed, with double bottom and close watertight subdivision. The arrangement of decks above water are to provide ample freeboard and berthing accommodations. It is contemplated to fit two military masts with fighting tops, to carry no sail. Each ship is to have two smoke pipes, which are to be in line athwartships, a position much affected by the British in their vessels. The two turrets for the 13-inch guns, which are to be mounted in pairs, will be located on the central line forward and aft and the fourteen 6-inch guns will be mounted behind a superstructure on the main deck and on an upper deck. The secondary battery of sixteen 6-pounders, four 1-pounders, four machine guns, and one field gun will be distributed about the ship where they will be of the most service. The total coal bunker capacity is to be such that at least 1,200 tons can be carried with loose stowage without trimming by hand. Quarters are to be provided for 600 men. A table is included in the circular, giving the principal weights to be carried. For the armament of the ship 550 tons is allowed; for ammunition, 437 tons, and for machinery 1,133 tons. The other weights are distributed among torpedo outfit equipment, etc. The complement of officers and men is to be 490. If the speed falls below 16 knots and exceeds 15 knots per hour, the vessel will be accepted at a reduction at the rate of $25,000 per ¼ knot to 15½ knots, and $50,000 from 15½ knots to 15 knots. If the speed falls below 15 knots per hour, the vessel will, in the discretion of the secretary of the navy, be rejected, or accepted at a reduced price. The contractors will be required to complete the vessels within three years from the date of the execution of the contracts. In case of delay a penalty will be imposed ranging between $75 and $200 per day for the first three and after the first six months, respectively, beyond the date of contract completion. The machinery to be supplied to the ships will weigh 1,050 tons, and in case of excess of weight in this feature, the contractor will incur a penalty of $500 per ton of such excess, and if the total weight be exceeded by 5 per cent., a further penalty of $10,000 will be enacted.

Reid's Work on the Cayuga.

Everybody on the lakes is, of course, very much interested in the efforts being made by Capt. James Reid to raise the steel steamer Cayuga of the Lehigh Valley line, which was sunk in collision in the Straits of Mackinaw in the spring of 1895, in about 100 feet of water, and which is a package-freight steamer of about 2,500 tons capacity, valued when new at $175,000, and having triple expansion engines of about 1,000 horse power, together with other outfit and appliances common to the best lake freight ships. The latest account of operations on the wreck is given by Capt. J. V. Tuttle, insurance agent of Milwaukee. Capt. Tuttle visited the wreck a few days ago. He found the work progressing slowly and learned from Capt. Reid that everything may not be in readiness for a lift before August 1. There are five cables to be passed under the hull. One of these is in position near the bow and the remaining four are still to be placed. They will be located amidship and fastened to a scow capable of carrying 1,000 tons, which will be placed directly over the hull and operated after the manner of all wooden pontoons. The steel pontoons, four in number, are cylinders 12 feet in diameter and about 25 feet long, with an estimated lifting capacity of 500 tons each. Two of these will be sunk on either side of the hull at the bow and two at the stern and made fast to the shaft. All but about 1,000 bushels of the 35,000 bushels of oats which the Cayuga carried have been pumped out. In getting at the hatches perhaps thirty barrels or sacks of flour were removed and brought to the surface, but because of the lifting power it is expected to afford, the remainder will not be disturbed until after the wreck has been towed into Little Traverse bay. Capt. Reid says he has tested the Cayuga's water bottom and finds that it can be inflated. This is a matter of the highest importance to him in the attempt to lift the wreck. It is Capt. Reid's intention at first merely to raise the Cayuga clear of the bottom, so that she can be towed into the quiet waters of Little Traverse bay, and after this has been accomplished all will be plain sailing for the wreckers, as the work of bringing her to the surface can be conducted without interruption winter and summer alike. The process of sweeping cables under the hull is the most tedious portion of the work in hand at present, as it can only be conducted in quiet weather and smooth water.

Compliments Regarding the Blue Book.

Orders for the Blue Book of American Shipping, published by the REVIEW, are coming in from sources highly complimentary to the work. One order on Monday of this week was from the office of naval intelligence and it was approved by Secretary Herbert. Another was from Capt. Geo. A. Zinn of the United States engineer corps, who is in charge of harbor improvements at Milwaukee. Recent orders from New York are from the Munson Steamship Line, running to Cuba and Mexico, the Erie Railroad Co., the Plant System and the Old Dominion Steamship Co. Many of the orders for the book contain complimentary references to it, as shown by the following extracts:

Albert Fisher, Chicago agent, Cleveland City Forge & Iron Co., Monadnock block: If the adage "there is no excellence without labor" is true then it is also certain that intelligent and well-directed labor must produce excellent results. This conclusion is emphasized by the beautiful design and artistic arrangement of data and the general fund of information, useful for all persons interested in shipping, that is contained in your Blue Book."

Edward A. Bunker, 27 and 29 William street, New York, agent in the United States for Wilford matchless waterproof cloth—"I send you check for advertisement in Blue Book. I am very much pleased with the book, and as I have received orders for goods amounting to much more than the expense of the advertisement, I think I am getting off cheaply."

Erie Oil Co., Erie, Pa.—"We find that the book is just what we want and a valuable addition to our office."

Mr. A. B. Wolvin of Duluth is evidently trying to do away with some of the sailor's old superstitions. His steamer Zenith City on her first trip, fresh from the ship yard, left on Friday, the 13th of the month, and again on Friday last, the day before July 4, his new steamer Queen City left the yard of the Cleveland Ship Building Co. on a trip to Lake Superior.

Leo Bernard of Sault Ste. Marie announces that his range lights on Waiskai bay and Birch point will, on July 15, be changed from red to bright lights. The position of the lights will also be a great deal higher than at present.

The Nickel Plate road sells homeseekers' excursion tickets to the south, June 16, July 17 and 21, Aug. 4 and 18, Sept. 1 and 15, Oct. 6 and 20. For detailed information write any agent of the Nickel Plate road, or address B. F. Horner, general passenger agent, Cleveland, O. 108-30

Cargo and Speed Record—Lake Freight Ships.

More cargo records are being made by the big new ships now leaving lake yards. The steamer Queen City, just completed by the Cleveland Ship Building Co. for A. B. Wolvin of Duluth, loaded 151,000 bushels of wheat (not 154,000 bushels as reported in newspaper dispatches) at Duluth, Wednesday, on a draft of 14 feet 4 inches. This is equal to 4,530 net, or 4,044 gross tons. It is 20,000 bushels greater than any cargo of wheat ever loaded in Chicago, and it would be interesting, therefore, to have one of the new vessels like the Queen City make a trip to Lake Michigan, in order to note the size of cargo that would be carried on the deeper draft afforded to Lake Michigan traders. The ore record from Lake Superior is also broken. The steel schooner Geo. N. Hartnell has just delivered at Ashtabula from Duluth a cargo of 3,981 gross, or 4,459 net tons of ore. This is 53 tons more than the cargo carried last fall by the steel schooner Aurania, which is a duplicate of the Hartnell. Following are the corrected records, in which it may be well to note that 1 per cent., the allowance for moisiure, is added to all bills of lading weights on ore:

Iron ore—Coralia, Mutual Transportation Co. of Cleveland, 4,738 gross or 5,307 net tons, Escanaba to Ashtabula, draft of 16 feet 1½ inches; S. S. Curry, Hawgood & Avery Transit Co. of Cleveland, 4,569 tons gross or 5,117 net tons, Escanaba to South Chicago, draft of 18 feet. Lake Superior cargoes—Schooner Geo. N. Hartnell, North Western Transportation Co. of Detroit, 3,981 gross or 4,459 net tons, Duluth to Ashiabula, draft of 14 feet 5 inches; steamer W. D. Rees, Wilson Transit Co., Cleveland, 3,876 tons gross or 4,341 net, Two Harbors to South Chicago, draft of 14 feet 4 inches.

Grain—Steamer Queen City, A. B. Wolvin of Duluth, 151,000 bushels of wheat, Duluth to Buffalo, 14 feet 4 inches draft; steel schooner Martha, Minnesota Steamship Co., 165,000 bushels of corn, South Chicago to Erie on 15 feet draft; S. S. Curry, Hawgood & Avery Transit Co. of Cleveland, 246,673 bushels of oats, Chicago to Buffalo.

Coal—S. S. Curry, Hawgood & Avery Transit Co. of Cleveland, 4,535 net tons bituminous, Conneaut to Gladstone; Selwyn Eddy, Eddy Bros. of Bay City, Mich., 4,252 net tons anthracite, Buffalo to Milwaukee.

Speed—Owego, Union Line of Buffalo, Buffalo to Chicago, 889 miles, 45 hours and 16 minutes, 16.4 miles an hour; Centurion, Hopkins Steamship Co. of St. Clair, Mich., Buffalo to Duluth, 997 miles, 67 hours and 50 minutes, 14.7 miles an hour.

Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store in regular elevators at the principal points of accumulation on the lakes on July 4, 1896:

	Wheat, bushels.	Corn, bushels.
Chicago	13,529,000	5,263,000
Duluth	8,312,000	15,000
Milwaukee	432,000	2,000
Detroit	61,000	11,000
Toledo	224,000	35,000
Buffalo	648,000	317,000
Total	23,206,000	5,643,000

As compared with a week ago, the above figures show at the several points named a decrease of 1,245,000 bushels of wheat and 451,000 bushels of corn.

Thus far this season, lake underwriters have been very fortunate, especially as far as total losses are concerned. Since the opening of navigation, only six vessels, including the S. F. Hodge, which was destroyed by fire on Lake Ontario Sunday, have actually passed out of existence. Aside from the Hodge, there was practically no insurance on these vessels, as they were of a low-grade kind, averaging not more than $5,000 each in value. In the Hodge disaster the greatest loss from the underwriters' standpoint was on the cargo, but this is understood to be not more than $17,000. Losses on steel vessels due to strandings and other accidents in the rivers have, of course, amounted to more than the items charged as total losses, but even these are less numerous than for several seasons past. Altogether, the underwriters will have reason to rejoice if their luck for the balance of the season is anything like what it has been thus far.

About July 15, a fixed red lens-lantern light will be established in the structure recently erected on the west pier at the entrance to Port Clinton harbor, Lake Erie. The light will be visible from all points of approach from the lake. It will be seen about eight miles in clear weather.

Solid through trains between Chicago and New York City via the Nickel Plate road. We will save you money on your ticket.

176-July 31.

Save money by purchasing tickets via the Nickel Plate road. Our rates are lower than other routes. 175-July 31.

In General.

Theodore D. Wilson, formerly chief constructor of the navy, died at the Charlestown, Mass., navy yard from apoplexy, on the 29th ult.

Life-savers are now experimenting with a sheet-iron kite, designed to enable distressed ships to communicate with the shore.

An 1,800-ton, four-masted wooden schooner, named S. P. Blackburn and of $72,000 value, was launched a few days ago by Percy & Small of Bath, Me.

The Japanese government has ordered four ironclads, four first-class cruisers (type of our New York), and two second-class cruisers (type of the Baltimore), from ship builders on the Clyde and Tyne.

J. Taylor Gause, who has been connected with the Harlan & Hollingsworth Co, ship builders of Wilmington, Del., for more than fifty years, is to retire from the presidency of the company and will be succeeded by Henry G. Morse. It is said that the change will result in an enlargement of the Wilmington company's plant.

The Columbian Iron Works has informed the navy department of its intention to submit bids on the three 30-knot torpedo cruisers, so that the Herreshoff firm will have one competitor, at least. It is the expectation of the department that the Cramps and Union Iron Works, and perhaps the Bath Iron Works, will also enter the contest for these contracts.

Plans have been made by the Harlan & Hollingsworth Co., Wilmington, Del., for a passenger steamer that is to surpass all of the big flyers now on Long Island sound. The new steamer is for the Providence & Stonington Steamship Co. and will be 400-foot long, with twin screws and big double sets of triple expansion engines. She will be named Vermont, as the Providence & Stonington company now has ships named for all New England States excepting Vermont.

Trade Notes.

The Bethlehem Iron Co. of South Bethlehem, Pa., is now ready to roll plates from high grade open hearth steel on their new plate mill, the rolls of which are 126 inches in length. Their product in this line will consist of plates for all purposes, which includes ship plate, boiler plate, tank, stack, etc.

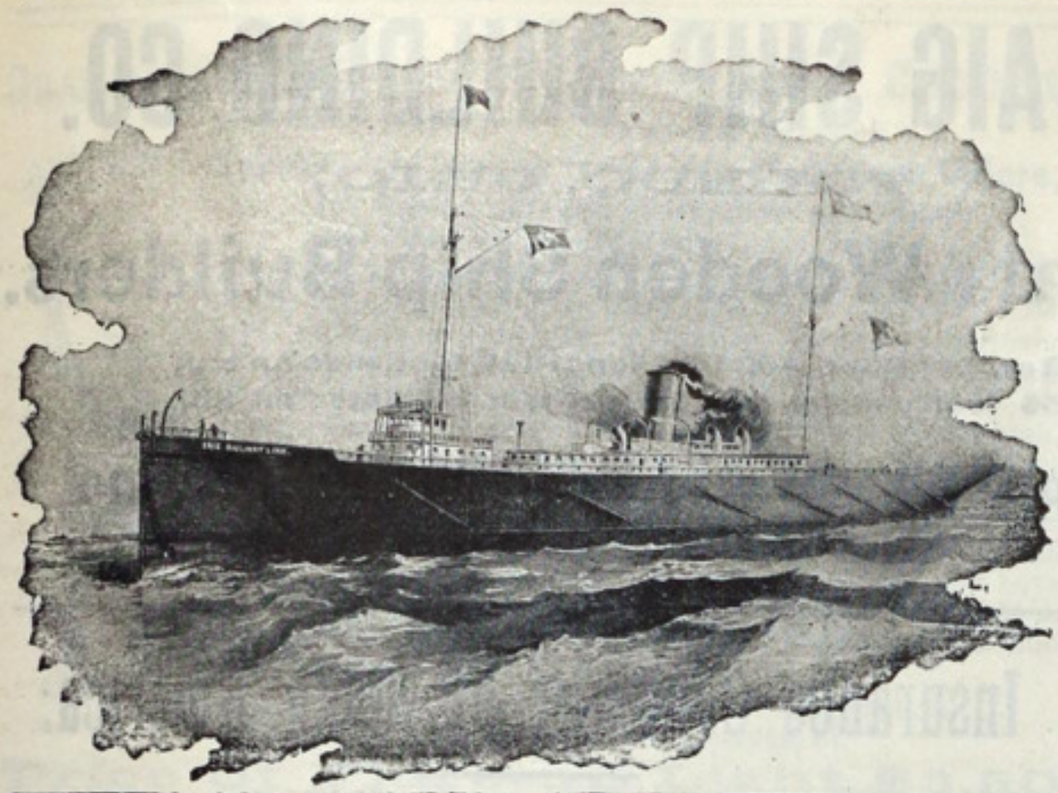
Facilities of the Roberts Safety Water Tube Boiler Co. have been so greatly enlarged of late that they have just completed a Roberts boiler of 150 horse power for the steam yacht Sultana, on an order from the Erie Basin Dry Dock Co., in eight working days from the time they received the order. The boiler was built in the Roberts company's best style, material all inspected, and every feature of construction carefully watched so that the boiler would pass inspection for 250 pounds of steam. Two weeks' time was allowed by the contract, but the owner was very anxious to have his yacht in commission on July 4, and the Roberts company decided that they would beat the record on boiler building, and have undoubtedly done so.

A note in the little advertising sheet published by the Penberthy Injector Co., Detroit, makes this comment on the achievement of the company in reaching an output of 100,000 injectors on May 12, 1896: "Taking 100,000 injectors at the average size, a ¾-inch machine, we get a total weight of 600,000 pounds, or thirty car loads. The combined capacity of this 100,000 injectors would equal over 30,000,000 gallons per hour. These figures apply only to the output of our Detroit factory during the nine years of its existence. In addition to this, our Canada factory has put out about 25,000 injectors. We have recently added a quantity of new and improved machinery and now claim to be the largest manufacturers of injectors in the world."

The Buffalo Forge Co. Buffalo, N. Y., has just issued an annual circular relative to disk wheels or ventilating fans. These wheels are now applied in various forms and with all kinds of power attachments in ships, factories, public buildings, and in fact in all places where ventilation is required, and the Buffalo company is in the lead in this line. One form of wheel that is in demand has a small engine directly attached. The engine is of the Buffalo double single acting type, and is enclosed and runs in oil. It is of the same high grade construction employed for these engines when they are built for running dynamos and other refined service. No governor, however, is used when directly connected to a fan. The use of disk wheels is thus rendered feasible for places having ample boiler capacity, but limited power. It also adapts them for locations where to transmit power by belt connections would be expensive in the first cost and subsequent maintenance.

Names and addresses of 3,140 marine engineers and portraits of nearly 100 engineers are contained in the Blue Book of American Shipping. It also contains a diagram of a modern triple expansion engine with names of all parts. Special terms to engineers and other employes on lake vessels. Write the MARINE REVIEW, Cleveland.

The Nickel Plate road sells tickets at rates lower than other routes. 174-July 31.



Rapid Fueling Docks,

DETROIT RIVER.

JAMES GRAHAM, Foot Twenty-first St., Detroit,

Below Routes of Passenger and Car Ferry Lines.

Pockets and Chutes arranged for different types of vessels.

BEST STEAM COAL.

Large Supplies and every effort to give dispatch, day and night Wide stretch of river for tows, and plenty of water at dock at all times.

Keeping a sharp look-out for Shipman's Koal Dock.

GIVE US a chance to prove that we can coal your boats with quick dispatch, and with most satisfactory fuel.

We have Four Large CHUTES on our Docks at AMHERSTBURG, ONTARIO, 1,000 FEET RIVER FRONT and Day and Night Force.

OUR STOCK CONSISTS OF

"Keystone" Massillon, Youghiogheny, and Best Grades of Hocking Koals.

O. W. SHIPMAN, MAIN OFFICE, 90 Griswold St., **Detroit, Mich.**

THE CUDDY-MULLEN COAL CO., Cleveland.

DEALERS IN **Best Grades of Steam Coal.**

Special Attention Given to Steamboat Fueling.

SHIPPING DOCK with Car Dumping Machine and Full Equipment for Rapid Fueling within Eastern Arm of Breakwater, Cleveland.

Steam Lighters Carrying Drericks and Lagre Buckets in Operation Day and Night within Cleveland Harbor. . . . . .

Pocket Dock now under construction on Sault River.

POCKET DOCK AT SANDWICH ON DETROIT RIVER, FORMERLY OWNED BY MULLEN & CATFIELD. . . . . .

Main Offices: Perry-Payne Building, Cleveland, O. Telephone No. 8.

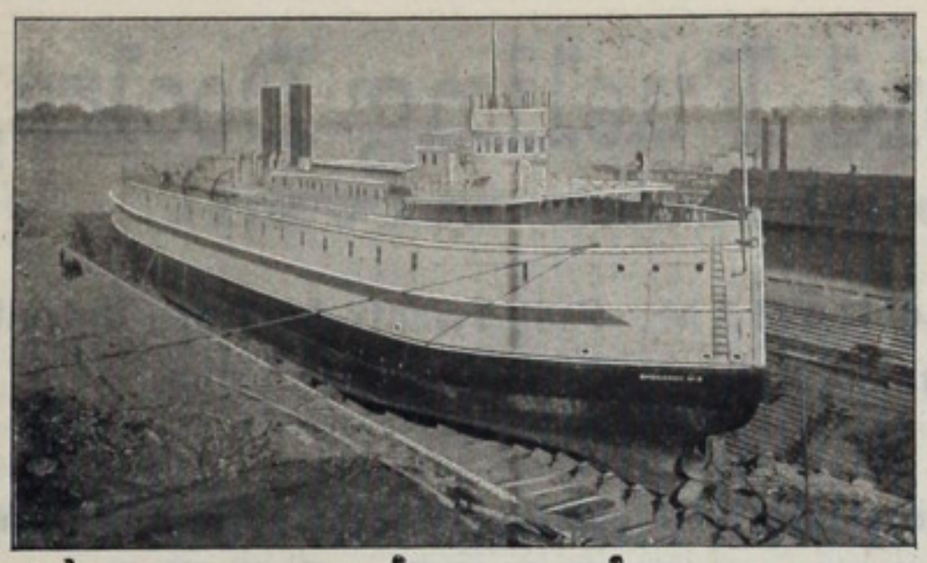
RIVER DOCK, West River Street. Telephone 1441.

THE BABCOCK & WILCOX CO.

FORGED STEEL WATER-TUBE MARINE BOILER,

29 CORTLANDT ST., NEW YORK.

Boilers sold to United States Merchant Marine and Yachts - - - - -	16,500	H. P.
Boilers sold to United States Navy - - - - - - - - - -	7,500	"
The only Water-tube Boiler in the British Merchant Marine	15,500	"



Shenango No. 2, 300 feet long, 54 feet beam.

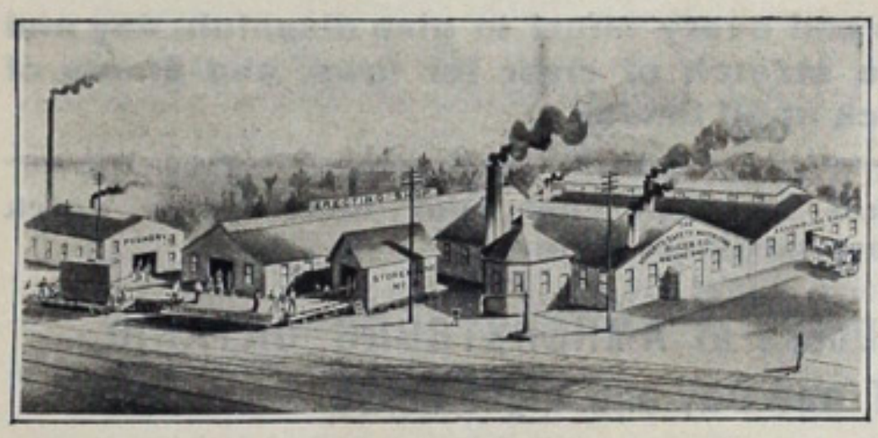
CRAIG SHIP BUILDING CO.

TOLEDO, OHIO,

Metal and Wooden Ship Builders.

New Dry Dock—450 feet long, 110 feet wide on top, 55 feet wide on bottom, 16 feet of Water on Sill.

Repairs to Metal and Wooden Ships A Specialty.



Chicago, Jan. 13, 1896.

THE ROBERTS BOILER CO.

Gentlemen: I cannot see but that the boiler in the "Mamie C" is just as good as it ever was, even if it is 17 years old. I had no complaint from it last summer.

Yours truly,
A. E. CLARK.

THE ROBERTS BOILER is the Cheapest, Best and Lasts Longest.
Adapted for use in Yachts, Launches, and Vessels of all Kinds.

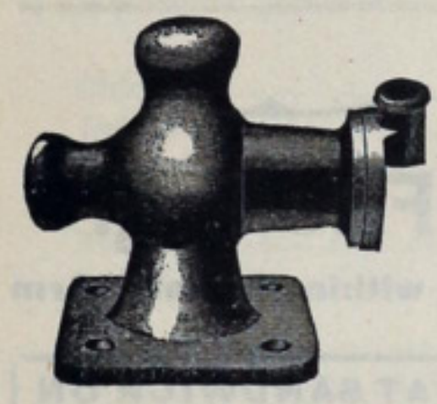
Handsome Illustrated Circular sent free on application to

The Roberts Safety Water Tube Boiler Co.,

WORKS, RED BANK, N. J. 39 & 41 Cortlandt St., NEW YORK.

PROPOSALS FOR IMPROVING ERIE HARBOR, Pa., U. S. Engineer office, D. S. Morgan Building, Buffalo, N. Y., June 19, 1896. Sealed proposals for dredging, and furnishing and placing rip-rap stone at Erie Harbor, Pa., will be received here until 11 o'clock A. M., July 20, 1896, and then publicly opened. Information furnished on application. T. W. SYMONS, Major, Engrs. July 18.

Enos Combined Bitt, Winch and Sheet Holder.



Patented in the United States, England and Canada.

Takes the place of wooden or iron bitts and forms a Combination Bitt and Winch. Takes up less room than the ordinary bitt. Can be used to great advantage as a Windlass or Sheet Holder on Yachts. An examination will convince you of the many uses to which it can be put.

Carried in stock by Ship Chandlers everywhere.

THE ENOS SHEET HOLDER CO.

Manufacturers and Proprietors, PEABODY, MASS.

P. M. CHURCH & CO.,

SAVINGS BANK BLOCK, SAULT STE. MARIE, MICH

LEADING DEALERS IN

Ship Chandlery,

Marine Hardware, Paints, Oils, Packings, Cordage, Etc

FIRST-CLASS COPPERSMITH AND TINSHOP IN CONNECTION.

INCORPORATED 1794.

Insurance Company of North America.

CAPITAL, Paid up in Cash, - - $3,000,000.00
ASSETS, - - - - - - - - 9,487,673.53

CHARLES PLATT, President. WILLIAM A. PLATT, Vice-President,
EUGENE L. ELLISON, 2nd Vice-President. GREVILLE E. FRYER, Sec'y. & Treas.
JOHN H. ATWOOD, Assistant Secretary.

Lake Marine Department. GEORGE L. McCURDY, Manager, CHICAGO, ILLS.

Gas Engine & Power Co.

MORRIS HEIGHTS, NEW YORK CITY.

SOLE MANUFACTURERS OF

The Only Naphtha Launch.

ALSO BUILDERS OF

High Class Steam Yachts and Electric Launches.

Send 10 cent stamp for Catalogue.

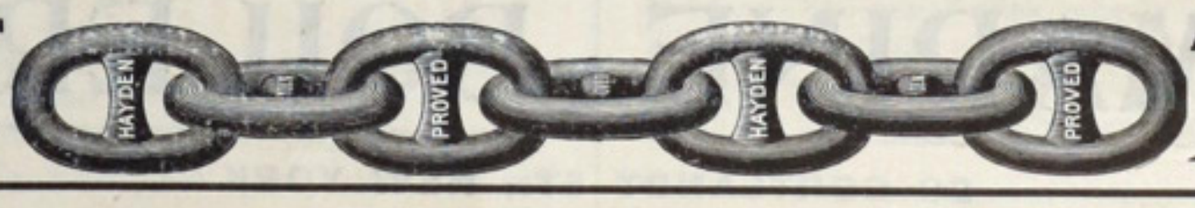
For Sale Cheap—Several tugs with engines all the way from 10x12 to 20x20 and all in good repair. For full particulars address:

INMAN TUG LINE,

B. B. INMAN, Manager, Duluth, Minn.

Chain Department ✻ P. HAYDEN S. H. CO. ✻ Columbus, Ohio.

Our Chain in use on the Largest Steamers on the Lakes:
The Zenith City, Victory, North West and North Land, and many others.



All kinds of Chain—
Stud and Close Link,
Cable Chains.
Write for Prices.

AMERICAN SHIP WINDLASS CO. P. O. BOX 53, PROVIDENCE, R. I.

BUILDERS OF THE

"Providence" Windlasses and Capstans

350 STYLES AND SIZES.
OVER 5000 IN USE.

SEND FOR CATALOGUE.

FRANK S. MANTON, AGENT.

GRAHAM-MEYER TORCH and LIQUID LIGHT COMPANY

89 Fulton St., Boston, Mass. MANUFACTURERS OF

Torches and Liquids for Lights of Various Colors,

For Signal Lights and Illuminations of all kinds.
Blue Flash Lights a Specialy.

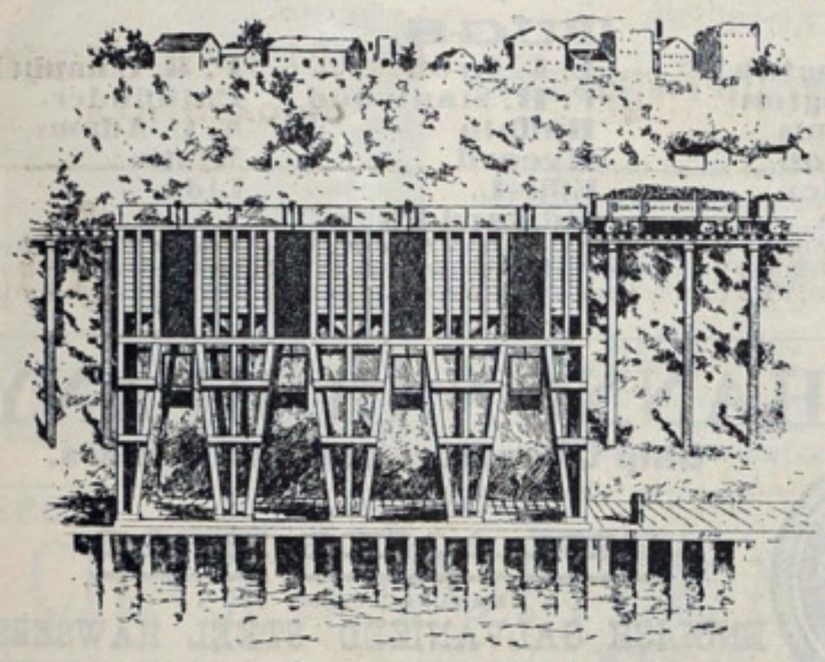
We call the attention of masters of vessels to the efficiency of our patented flare-up or flash light torch. It can be used with kerosene or spirits of turpentine. Its superiority over all other kinds of torches is that it is indestructible. Being filled with asbestos, it will last for years, and is ready for use at any moment. It gives a white flame three to five feet high, burns less liquid than any ordinary torch of the samc size or larger. The combustion is so perfect that very little smoke is made, and the flame is therefore much brighter. At night you can wigwag with this torch. Rain or spray will not extinguish it, and the stronger the wind the better it burns. We have also a **Blue, Green and Red Burning Liquid,** to make any code of signals required. Yachtsmen will find this of immense value for signaling.

Lake Agents: { The Upson-Walton Co., Cleveland, O.
H. Channon Co., Chicago, Ill.

Price of Flare-up Light, $3.50

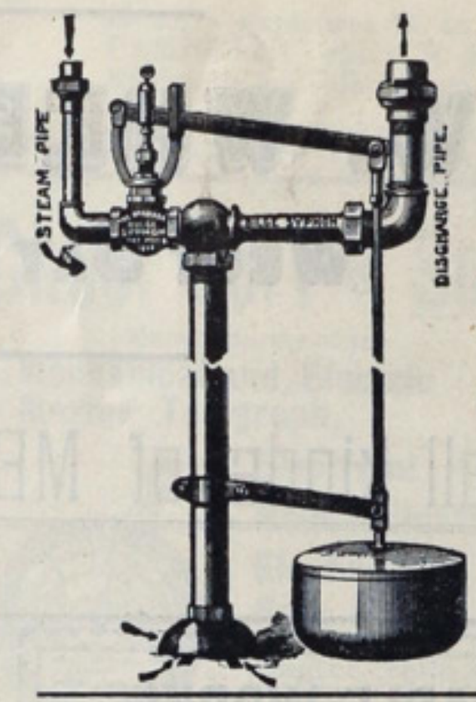
FUEL DOCKS OF OSBORNE, SAEGER & CO.

Cuyahoga River, just above Superior St. Viaduct, Cleveland, O.



Best Youghiogheny Steam Coal Furnished Day or Night. No delay as Elevated Pockets are used.

THE BRAENDER AUTOMATIC BILGE SYPHON,



Always on Watch
"SHIP AHOY."

It never tires, or goes to sleep, and is reliable at all times.

It is the best, cheapest and surest way of keeping your vessel dry.

They are indorsed by leading Engineers throughout the country.

They commend themselves wherever placed.

A dry bottom in ship's holds gains speed, which is equal to money.

By giving it a trial, it will speak for itself.

Write for circular,

PHILIP BRAENDER,
261 West 118th Street, • NEW YORK.

COLUMBIA MFG. CO.

Manufacturers of

METAL POLISH, ✻ BUFFING COMPOSITIONS.

A great labor saver.
Especially adapted for Marine Engines.
1 lb. tin boxes, 45 cents; 5 lb. pails, $1.50.

94 Holmden Ave., CLEVELAND, O.

John Thompson, 123 River St., Agent, Cleveland, O.

C. S. Richardson Fueling Co.

FUELING DOCKS:
NORTH PIER
18TH STREET BRIDGE,
ILLINOIS CENTRAL SLIP "C."

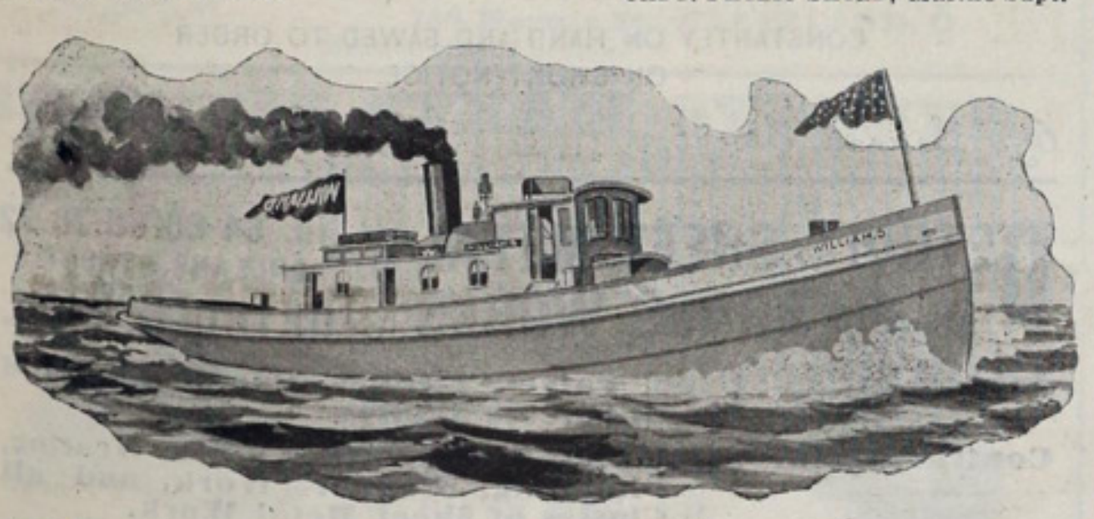
STORAGE DOCKS FOR ANTHRACITE:
KINGSBURY ST. BETWEEN INDIANA & ERIE STS.
ELSTON AVE. DIVISION ST. BRIDGE, (NORTH BRANCH.)
NORTH AVE. BRIDGE.
DIVISION ST. BRIDGE, (OGDEN CANAL.)
SOUTH HALSTED ST. BRIDGE.

COAL

OFFICE,
225 DEARBORN ST.
CHICAGO.

C. E. GROVER, Prest.
D. R. HANNA, V. Prest.

W. A. COLLIER, Sec. & Sreas.
CAPT. PHILIP SHIRD, Marine Supt.



The Ashtabula Tug Co.

Main St. Bridge,
CLEVELAND, O.

INCORPORATED. W. A. COLLIER, Gen. Mgr.
CLEVELAND, Tel. 409. ASHTABULA, Tel. 149.

JOHN HAUG,

Consulting Engineer and Naval Architect.

Ship and Engineer Surveyor Lloyds Register, London.
Plans, Specifications and Superintendence of Ships and their Machinery.
Specialties—Bulk Oil Vessels High Speed Yacht Engines, etc.

206 Walnut Place, Philadelphia.

THE WILLIAMS & RODGERS CO.

SUPERIOR and SENECA STREETS.

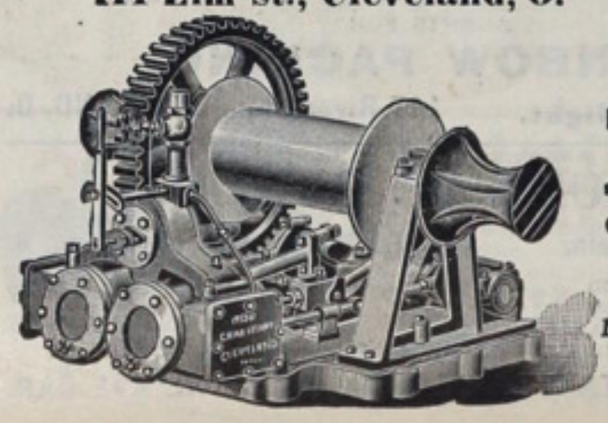
BOAT SUPPLIES

We make special rates to vessel owners on Dry Goods, Bedding, Floor Coverings, Furniture, Kitchen Utensils, etc.

THE WILLIAMS & RODGERS CO, CLEVELAND, O.

The Chase Machine Co.

111 Elm St., Cleveland, O.



MACHINISTS and ENGINEERS

MANUFACTURERS OF
Land and Marine Engines and Steam Pumps,

SOLE OWNERS AND MANUFCTURERS OF
Chase Fog Whistle Machine.
Over 150 in use on the best class of Lake Steamers.
Special Attention given to
MARINE REPAIR WORK.
Engineers' Supplies.
Asbestos Pipe and Boiler Covering.
TELEPHONE 984.

F. W. WHEELER, President. E. T. CARRINGTON, Vice-President. C. W. STIVER, Secy. and Treas.

F. W. WHEELER & CO.,

West Bay City, Mich.

Builders of all kinds of METAL AND WOODEN SHIPS.

AMERICAN CHAIN CABLE WORKS.

ESTABLISHED 1865.

Cable, Dredge, Quarry, Shipping, Crane and Rafting

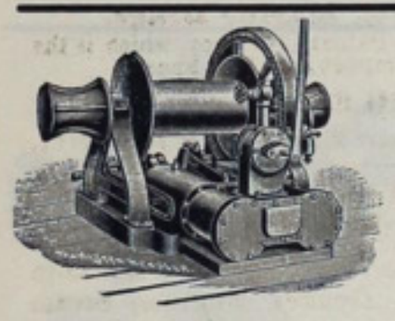
CHAINS.

Our Dredge and Crane Chains are made of Iron Rolled Specially for that purpose in three qualities, "Burden's," "H. B. & I." iron, and "Burden's Best Best" iron.

THE J. B. CARR COMPANY, TROY, NEW YORK.

THOS. DREIN & SON, TATNALL AND RAILROAD STS., WILMINGTON, DEL.

Builders of Metallic Life Boats and Rafts, Yachts and Pleasure Boats, Life Preservers. Outfit for Lake Steamers a Specialty.



DOCK and DECK HOISTS

ALL KINDS OF

Machinery & Friction Hoists.

SEND FOR PRICES AND CIRCULARS.

JACKSON & CHURCH, SAGINAW, MICH.

THE "CINCINNATI"

AUTOMATIC

STEAM STEERING GEAR

A Simple, Powerful Machine. Noiseless and Sure.

SEND FOR CIRCULAR.

FRONTIER IRON WORKS, DETROIT, MICH.

HOWARD H. BAKER & CO.

Ship Chandlers and Sail Makers,

18 to 26 Terrace. BUFFALO, N.Y.

H. E. STEVENS. TOM MEAD. LEW PRESLEY

BUCKEYE STEAM FITTING CO.

Steam Fitters, Engineers Supplies,

Phone 4058. AGENTS FOR

RAINBOW PACKING.

Open Day and Night. 117 River St., CLEVELAND, O.

CAPT. SAMUEL W. GOULD,

Ex-Ass't Inspector of Steam Vessels, 265 Marcy Ave, Cleveland, O.

Gives instructions in Navigation and prepares Candidates for the Examinations, for Master and Pilots Licenses, before the Local Steamboat Inspectors.

Also Instructions given in the Safety Valve and other Problems required by Candidates for Engineers License.

TERMS REASONABLE. TAKE WADE PARK OR PAYNE AVE CAR.

B. B. INMAN, Manager. H. G. INMAN, Sec'y and Treas.

Inman Tug Line.

Office on N. P. Dock, Open Day and Night.

TELEPHONE 146. DULUTH, MINN.

Finest outfit at the head of the lakes for log towing.

TUGS.

M. D. Carrington	L. L. Lyon	P. B. Campbell
E. T. Carrington	F. H. Stanwood	Pathfinder
J. L. Williams	Buffalo	A. C. Adams
Bob Anderson	Record	Mystic
Joe D. Dudley	Effie L.	Lida
W. B. Castle	Edward Fiske	

Tugs, Hawsers, Steam Pumps, Lighters and Divers Furnished on Short Notice.

Also owners of Steamer Belle Cross and Schooner Clement and Chicago Board of Trade. Three 12-inch Am. Fire Engine Company's Wrecking Pumps, and one 12-inch Worthington Pump.

H. CHANNON COMPANY

Ship Chandlers and Sail Makers.

H. CHANNON CO. 24 & 26 Market St. CHICAGO, ILL.

AGENTS FOR

RYLANDS BROS.

MANUFACTURERS OF

ENGLISH GALVANIZED STEEL HAWSERS,

24-26 Market Street, CHICAGO, ILL.

The Martin-Barriss Co.

IMPORTERS AND MANUFACTURERS OF

Mahogany, White Mahogany,

AND ALL NATIVE CABINET WOODS.

HIGH GRADES OF KILN DRIED WOODS FOR CABIN WORK AND INSIDE TRIM.

White Oak Timbers and Plank

CONSTANTLY ON HAND AND SAWED TO ORDER ON SHORT NOTICE.

654 Seneca Street, Cleveland, Ohio.

DETROIT SHEET METAL AND BRASS WORKS

No. 64-66-68-70-72 ORLEANS STREET, DETROIT, MICH.

Jobbers of..... Pipe, Valves, Fittings. Packing, Oil and Engineers Suplies.

Contractors for High Class Steam Fitting, Steam Heating, Plumbing, Copper Work, and all Classes of Sheet Metal Work.

Manufacturers of Clark's Patent Metallic Life Raft, Side Lights, Marine Hardware, Hurricane, Cabin and Platform Lamps, Trip Gongs, etc.

Agents for..... Laidlaw - Dunn - Gordon Steam Pumps, Warren Webster's Specialties, and Buffalo Forge Co.'s Fans, Engines and Heaters.

Engineers can be waited on promptly day or night.

DIXON'S Graphite Pipe Joint Compound

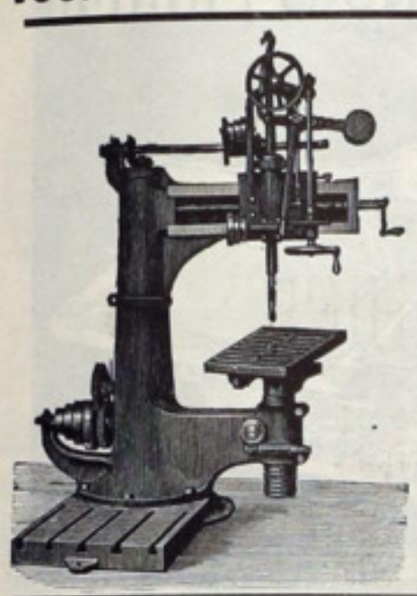
Enables you to MAKE A TIGHTER JOINT than you can possibly make with red lead. You can do it easier, and parts can be separated at any time without breaking anything. Send for sample and circular.

JOS. DIXON CRUCIBLE CO., JERSEY CITY, N. J.

DIXON'S Lubricating Graphite

Is fully explained in an INTERESTING AND INSTRUCTIVE PAMPHLET which is FREE to all interested. It will pay all Engineers and Machinists to SEND FOR IT.

JOS. DIXON CRUCIBLE CO., JERSEY CITY, N. J.



Bement, Miles & Company,

PHILADELPHIA, PA.

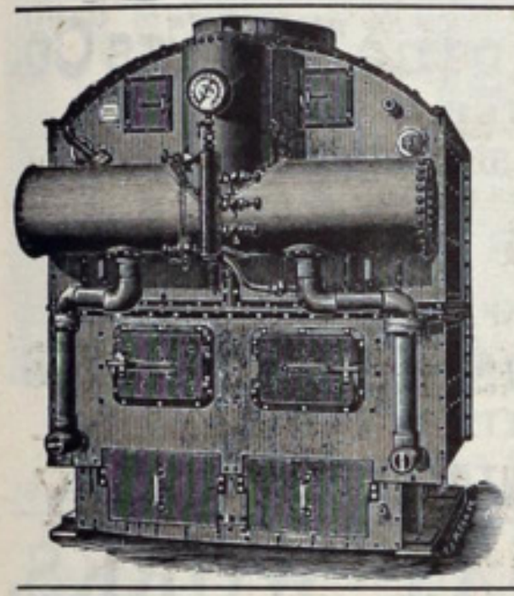
MANUFACTURERS OF

Metal Working Machine Tools

For Ship Yards, Railroad Shops, Locomotive and Car Builders, Machine Shops, Rolling Mills, Steam Forges, Boiler Shops, Bridge Works, etc., etc.

Steam Hammers, Steam and Hydraulic Riveting Machines.

New York Office: Taylor Bldg. No. 39 Cortlandt St.
Chicago Office: 1534 Marquette Building.



ALMY'S PATENT

SECTIONAL

Water • Tube • Boilers.

NOW USED IN

18 Passenger Boats from 70 to 160 feet long.
27 Steam Yachts from 50 to 160 feet long.
U. S. Torpedo Boat "Stiletto."
Numerous Small Launches and Stationary Boilers are giving most excellent results.

ALMY WATER-TUBE BOILER CO.,

No. 178-184 Allens Avenue, near Rhodes St.
PROVIDENCE, R. I.

1880. 1896.

CHAS. H. POTTER & CO.,

Investment Bankers,

Cleveland, O.

Dealers in

Lake Superior Iron Mining Stocks, Municipal, Water Works and Street Railway Company Bonds.

We buy and sell for cash all securities listed on the New York, Boston, Chicago, Philadelphia, Cincinnati and Pittsburg stock exchanges.

TRY OUR

GRAPHITE PAINTS

For VESSELS, STACKS, DECKS, HULLS, ETC.

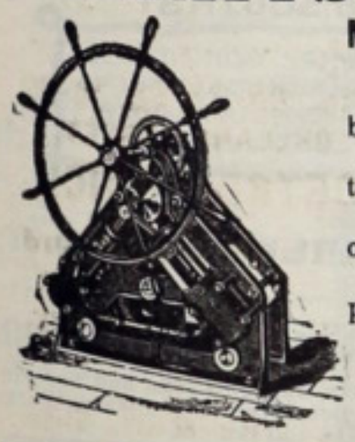
They have No Superior. They are Durable.

CLEVELAND IRON ORE PAINT CO.

156 Merwin St., CLEVELAND, O.

Mention Marine Review.

SHERIFFS STEAM STEERER.



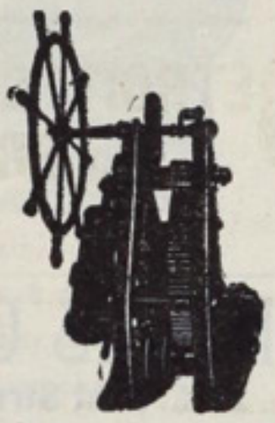
MADE IN TWO SIZES.

Are easy to adjust and can be handled by any one.

The Steerer can be arranged to set in pilot house or aft.

No Steerer will be sold without a quadrant.

Steerer will be sold on approval.



Manufactured by

SHERIFFS MFG. CO.

126-130 Barclay Street,
MILWAUKEE, WIS.

Paint your Vessels with **Superior Graphite Paint.**

NO BLISTERING, CRACKING OR SCALING.

Made especially for Stacks, Decks, Sides, Hulls and Water Compartments. Strictly anti-rust, and most durable and economical.

DETROIT GRAPHITE MFG. CO., 541 River St., Detroit, Mich.

Chas. Corv & Son

Manufacturers of the

Mechanical and Electric Marine Telegraph,

Electrical Helm Indicators

Electric Call Bells.

Engine Bells and Brass Work of all descriptions, Shrieking and Siren Whistles.

278 DIVISION ST.,
NEW YORK CITY.

Alfred B. Sands & Son

Yacht Plumbers.

MANUFACTURES OF

YACHT PLUMBING SPECIALTIES.

Pump Water Closets, for above or below water line.

Folding Lavatories, Ventilators, Pumps, Deck Plates, Etc.

134 Beekman St., NEW YORK.

NEVERSINK CORK JACKET AND LIFE BELT.

Warranted 24 lb. Buoyancy and full Weight of Cork, as required by U. S. Inspectors.

Consolidated Cork Life Preservers. Superior to all others. **Ring Buoys and Fenders.**

SAFEST, CHEAPEST. Approved and adopted by U. S. Board of Supervising Inspectors.

Also adopted by the principal Ocean, Lake and River Steamer Lines as the only Reliable Life Preserver. Vessels and the trade supplied. Send for catalogue.

Awarded four Medals by World's Columbian Exposition

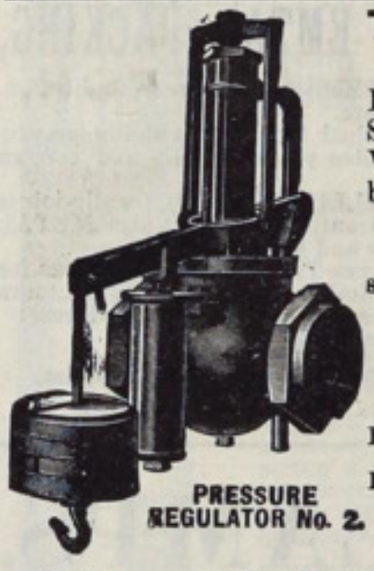
Metallic and Wooden Life Boats.

Metallic Life Rafts, Marine Drags.

Manufacturer of Woolsey's Patent Life Buoy, which is the lightest, cheapest and most compact Life Raft known.

Send for Illustrated Catalogue. **D. KAHNWEILER,**

Get our prices before buying elsewhere. 437 Pearl Street, NEW YORK CITY.



PRESSURE REGULATOR No. 2.

The "DAVIS" Pressure Regulator and Reducing Valve.

Is the simplest and best for reducing the pressure to Steam Steering Engines, Donkey Engines, Steam Winches and all places requiring a uniform pressure below that of boilers.

No diaphragms, spring or packing.

Cut shows scale weights. We can furnish lever and sliding ball weight if preferred.

MANUFACTURED BY

G. M. DAVIS & CO.

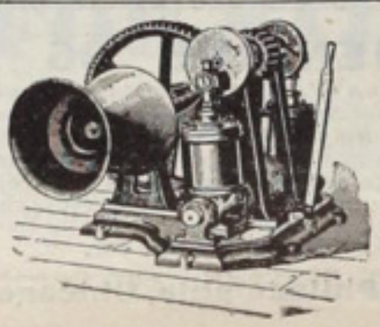
106 N. Clinton St., CHICAGO, ILL.

FOR SALE BY

R. E. Hills, Chicago. C. H. McCutcheon, Buffalo
Geo. Worthington Co., Cleveland.
P. M. Church, Sault Ste. Marie. Jas. Walker & Son, Detroit
Jas. Clements & Son, Bay City, Mich.
Cleveland Ship Building Co., Cleveland.
Chicago Ship uilding Co., Chicago.

Selling agents—The McIntosh-Huntington Co., Cleveland, O.; The Detroit Sheet Metal and Brass Works, Detroit, Mich.

TO ENGINE AND BOILER MAKERS. Office of Light House Engineer, 9th and 11th Districts, Detroit, Mich., July 1, 1896. Sealed proposals will be received at this office until 2 o'clock p. m. of Wednesday, the 22d day of July, 1896, for furnishing the boilers, machinery, etc., for six complete steam fog signals, in sets of two, delivered at the Light House depot at Detroit, Mich. Plans, specifications, forms of proposal, and other information may be obtained on application to the undersigned. The right is reserved to reject any or all bids, and to waive any defects. M. B. ADAMS, Major of Engineers, U. S. A., Light House Engineer. July 17



Hoisting Engines.

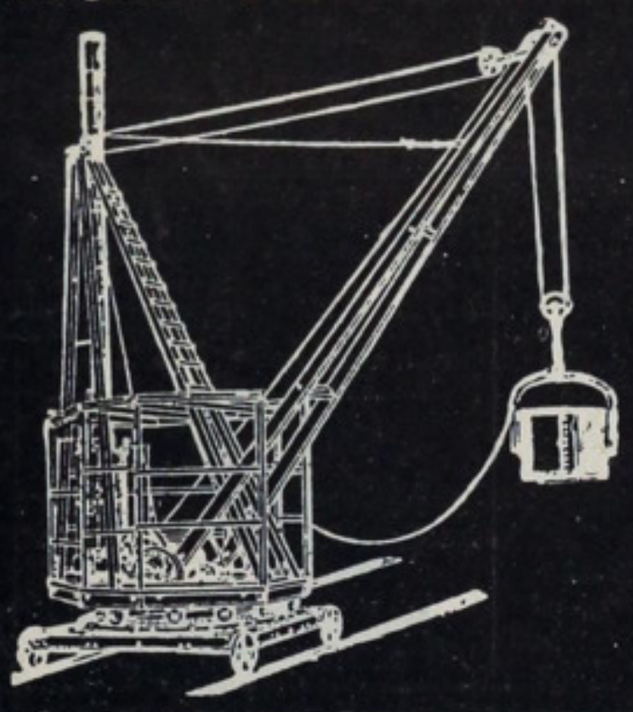
We build them in all sizes from new and improved designs. Every engine thoroughly tested before leaving our shop, and guaranteed to be satisfactory in every case. When in want of a Hoist for marine work, dock work, mining or any other purpose, kindly permit us to name you prices. We know we can please you.

Marine Iron Co., Bay City, Michigan.

McMYLER MANUFACTURING CO., 180 COLUMBUS STREET, CLEVELAND, O.

SOLE MAKERS OF THE

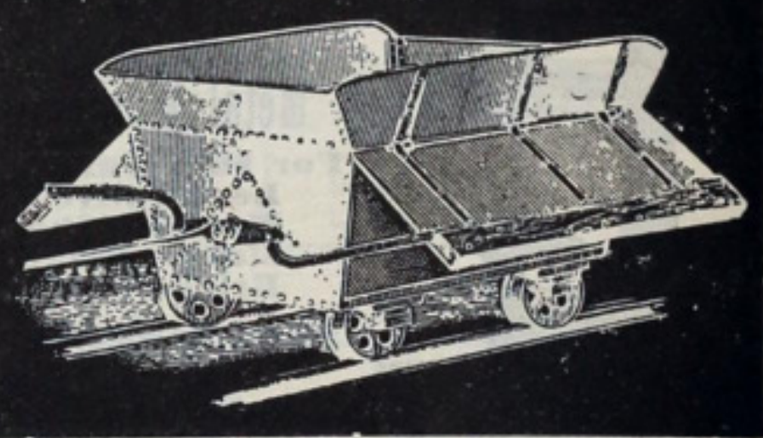
McMYLER PATENT REVOLVING STEAM DERRICK



FOR HANDLING COAL, ORE AND COARSE FREIGHT OF ANY DESCRIPTION.

This Derrick can Lift Load, Alter the Radius of Boom, Swing in Either Direction at Will of Operator, and can Propel Itself on Track any Desired Distance.

BUILT FOR ANY CAPACITY WANTED



BUILDERS OF
CONVEYORS, COAL BUCKETS, ORE BUCKETS AND DUMP CARS.

"IMPROVEMENT THE ORDER OF THE AGE."

IF YOU DESIRE TO LEARN

Respecting the merits of the THREE NEW MODELS, Nos. 2, 3 and 4, SMITH PREMIER TYPEWRITERS, drop us a line. They embody the Most Progressive Mechanical Principles, and are "up-to-date" in every respect.

The Smith-Premier Typewriter Co.

348 Superior Street, City Hall Building, CLEVELAND, OHIO.
Competent Operators Furnished. TELEPHONE 339.

FOR SALE CHEAP

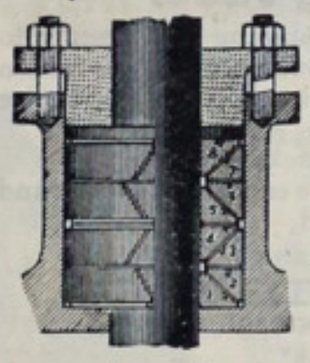
Excursion Steamer **"CORONA"**

Capacity 1100 Passengers. (Day Boat.)

FOR FULL INFORMATION APPLY TO

WOODLAWN BEACH CO., 27 Lewis Bldg., BUFFALO, N.Y.

KATZENSTEIN'S Self-Acting EMTAL PACKING,



For PISTON RODS, VALVE STEMS, etc., of every description, for Steam Engines, Pumps, etc., etc.

Adopted and in use by the principal Iron Works and Steamship Companies, within the last twelve years, in this and foreign countries.

FLEXIBLE TUBULAR METALLIC PACKING, for slip-joints on Steam Pipes, and for Hydraulic Pressure; also METAL GASKETS for all kinds of flanges and joints.

DOUBLE-ACTING BALANCED WATER-TIGHT BULKHEAD DOORS for Steamers. Also Agents for the McColl-Cumming PATENT LIQUID RUDDER BRAKE. For full particulars and reference, address:

L. KATZENSTEIN & CO.,
General Machinists, Brass Finishers, Engineers' Supplies,
357 West St., New York.

SHIP LAMPS.

OIL AND ELECTRIC FIXTURERS

FOR

Steamships, Yachts, &c.

GREAT VARIETY OF DESIGNS.

Prices and Cuts on Application.

PAGE BROS. & CO.,

347 to 357 Cambridge St. Boston, Mass

'96 JENKINS '96

Is the Perfection of Joint Packing, Instantaneous, Does not Squeeze out and not necessary to follow up joint. We guarantee it to last for years on any and all pressures of steam or any kind of joint where packing is required. *Does not rot, burn or blow out,* therefore the best for all purposes. Call for and insist on having '96 JENKINS '96 stamped like cut.

JENKINS BROS. New York, Boston, Philadelphia, Chicago.

The Bertram Engine Works Co.

(LIMITED.)

ENGINEERS AND SHIP BUILDERS.

MARINE ENGINES AND BOILERS.

STEEL AND COMPOSITE

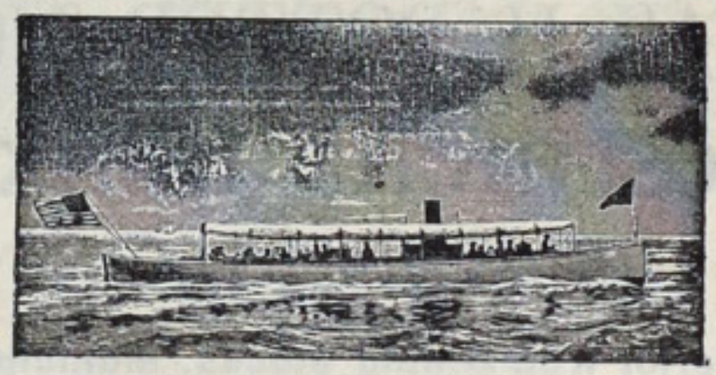
STEAMERS, TUGS and YACHTS.

ROBERTS AND MOSHER SAFETY WATER-TUBE BOILERS.

Office and Works: Niagara & Bathurst Sts., TORONTO, ONT., Ship Yard: Foot of Bathurst St.

DETROIT BOAT WORKS.

STEEL and WOODEN



YACHTS and LAUNCHES.

BUILDERS OF *ELECTRIC LAUNCHES,* DETROIT, MICH.

Any Class Wooden, Iron or Steel Boats up to 150 ft. in length.

YAWLS. METALLIC LIFE BOATS. LIFE RAFTS.

All kinds of Small Pleasure Boats.

The electric launches used on the lagoons at World's Fair were manufactured by this company.

Send for new illustrated Catalogue of electric launches.

For special prices on DEADLIGHTS, write

THE MARINE MANFG. AND SUPPLY CO.
158 SOUTH ST.
SHIP MACHINERY. YACHT FIXTURES.
STEAMSHIP, ENGINEERS & CONTRACTORS
SUPPLIES. ANCHORS. CHAINS. OAKUM.
TOOLS. CORDAGE. WIRE ROPE. ETC

NEW YORK, N. Y.

MIERS CORYELL

21 E. 21st Street, NEW YORK.

Consulting Mechanical Engineer,

Plans, Specifications and Superintendence. Marine and Water Works Engines and Boilers.

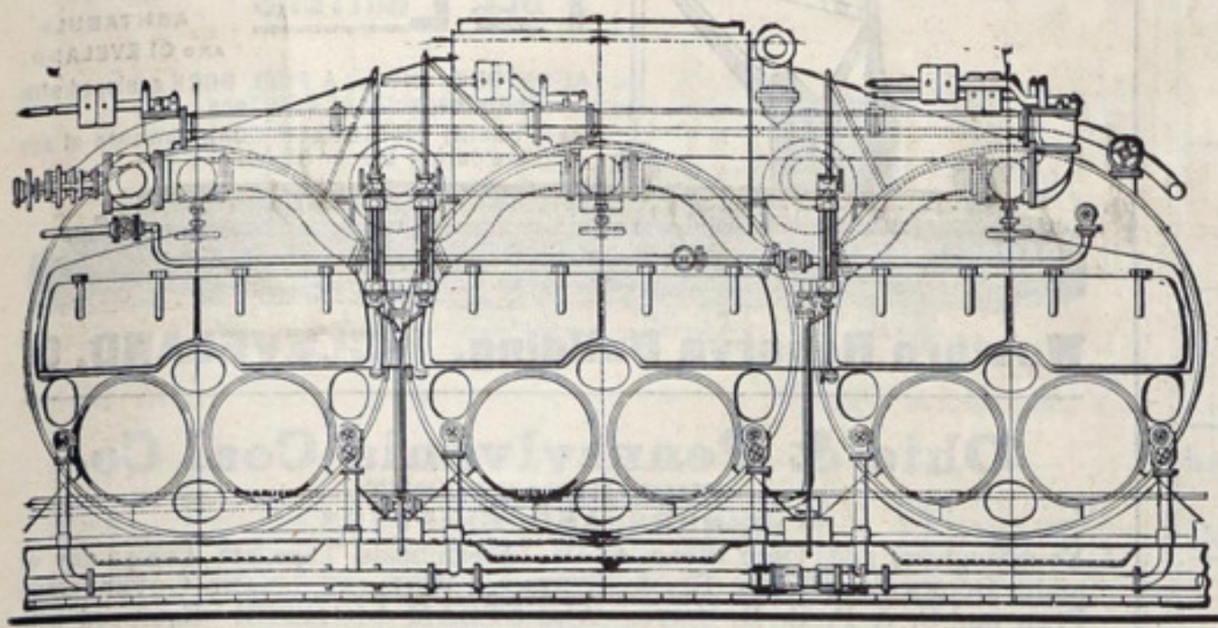
JEFFERY'S MARINE GLUE

Can be obtained from the following well-known firms:

L. W. Ferdinand & Co.	Boston, Mass.
Howard H. Baker & Co.	Buffalo, N.Y.
Geo. B. Carpenter & Co.	Chicago, Ill.
H. D. Edwards & Co.	Detroit, Mich.
Upson-Walton Co.	Cleveland, Ohio.
M. I. Wilcox Cordage & Supply Co.	Toledo, Ohio

Send for Samples and Circulars.

LAKE ERIE BOILER WORKS, BUFFALO, N. Y.



THE BEST EQUIPPED PLANT IN AMERICA

FOR THE MANUFACTURE OF

MODERN MARINE BOILERS.

Nickel Plate Ahoy? Aye, Aye Sir!
The line to hail and the line to take
To reach your craft to fit her out,
Is the well-known, ship-shape Nickel Plate Route.
Chicago, Cleveland, Buffalo,
Or any port you want to go,
The shortest time and lowest rate
Are shipmates with the Nickel Plate.

A SUPERB DINING CAR SERVICE.

For particulars inquire of

A. W. JOHNSTON, Genl. Supt. or, **B. F. HORNER,** Genl. Pass. Agt.

CLEVELAND, O.

"The most perfect feed water heater and purifier we ever saw."—R. HAMMOND.

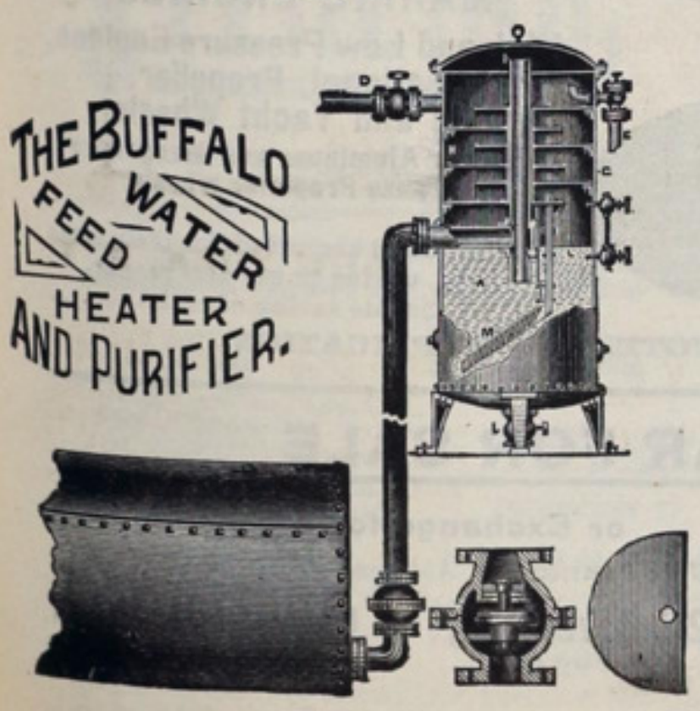
IN PRACTICAL USE ON 25 LAKE STEAMERS.

Every Purifier Warranted to Remove all Sediment or Scale-Forming Substance.

ROBERT LEARMONTH PATENTEE,

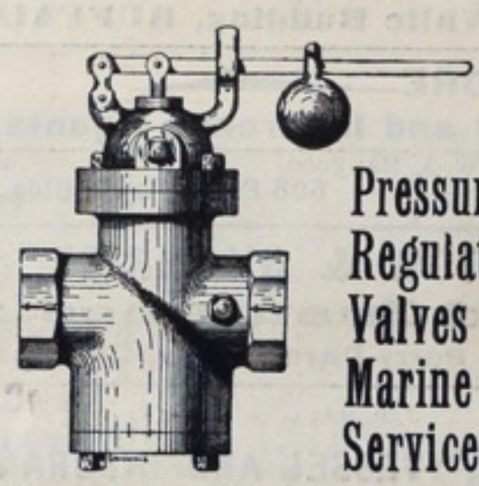
200 BOUCK AVENUE, - - - - - BUFFALO, N. Y.

THE BUFFALO FEED WATER HEATER AND PURIFIER.



REFERENCES.

A.—Settling chamber.
B.—Boiler.
C.—Feed pipe to boiler.
D.—Steam pipe.
E.—Water supply pipe.
F.—Check valve.
G.—Spray disks.
H.—Spray chamber.
I.—Equalizing tube.
J.—Blow-off pipe.
K.—Automatic shut-off valve.
L.—Division plate.
M.—Deflecter and separator.



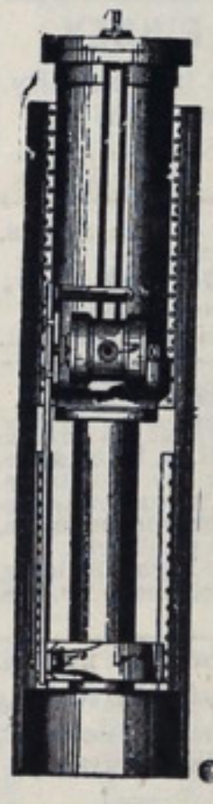
Pressure Regulating Valves for Marine Service.

Special attention given to Marine Engine and Pump Repairs.

Write for Estimates and Catalogue.

C. H. BURTON PUMP WORKS

Main St. cor. Center, **CLEVELAND, O.**



A. J. DUPUIS,

16 Atwater Street W., DETROIT, MICH.,

CONTRACTOR FOR

Dock Building, Bridge and Trestle Work,

Pile Driving and Foundation Work.

Dry Dock Building; builder of Detroit Dry Dock Co's New Dry Dock.

PATENTEE AND MANUFACTURER OF

Dupuis Steam Pile Driving Hammer,

Which is very effective, in that it is forced by steam in the down stroke, (which is not the case in other pile drivers), making the ram strike a quick and powerful blow. One advantage of this Hammer over others is, that the steam hose is inside the leaders, and not in the way of hoisting the piles as is the case in other steam hammers.

TWO SIZES of these Hammers are made, one weighing 5000 lbs, and one 7000 lbs. ☞THE WORKING OF HAMMERS GUARANTEED.

STEAM YACHT AMADIS....

Will be for charter to private parties for long or short cruises on the lakes or to the sea.

Address for particulars,

G. H. KIMBALL, 95 Adelbert St., Cleveland, O.

FOR SALE

60x10 ft. **STEAM LAUNCH**, 4½ Compound Engine and Condensers, Steam Pumps, etc., Kitchen, Berths, fully equipped, and in first-class order. For particulars inquire Room 65, 94La Salle Street CHICAGO, ILL.

FREE SAMPLE COPY OF HOME STUDY.
...An Elementary Journal for Students
Of Mechanics, Electricity, Architecture, Mining, Plumbing, Heating and Ventilation, Steam Engineering, Civil Engineering and Mechanical and Architectural Drawing.
HOME STUDY, Box 965 SCRANTON, PA.

HARVEY D. GOULDER,
LAWYER AND PROCTOR IN ADMIRALTY,
CLEVELAND, O.

ALBERT J. GILCHRIST, PROCTOR IN ADMIRALTY,
No. 604 PERRY-PAYNE BLDG., CLEVELAND, OHIO.

C. E. KREMER, *Attorney and Counselor-at-Law and Proctor in Admiralty.*
Rooms 14, 15 and 16, Bryan Block, 164 LA SALLE ST., CHICAGO, ILL.

BROWN & COOKE,
Counselors at Law and Proctors in Admiralty,
106-107-108 White Building, BUFFALO, N. Y.

HAWGOOD & MOORE W. A. HAWGOOD. J. W. MOORE.
Vessel and Insurance Agents,
Residence Phone, Doan 446—W. A. Hawgood.
Long Distance Tel. 2395. 608 Perry-Payne Bldg., CLEVELAND, O.

J. H. BARTOW. C. P. GILCHRIST. **BARTOW & GILCHRIST,** TELEPHONE 717.
Vessel and Insurance Agents,
611 and 612 Perry-Payne Bldg., Cleveland, O.

ALEX. CLARK. J. B. HALL. J. H. KILLERAN, *Marine Surveyor.*
A. Clark & Co. VESSEL AND INSURANCE AGENTS,
Tel. No. 892. 55 Main St., BUFFALO, N.Y.

JOHN MITCHELL. JOHN F. WEDOW. ALFRED MITCHELL.
MITCHELL & CO.,
Vessel and Insurance Agents,
508, 509 and 510 Perry-Payne Building, CLEVELAND, OHIO
Office Telephone, 737. Residence, John Mitchell, 3506.

C. R. JONES & CO., VESSEL AGENTS,
FIRE AND MARINE INSURANCE.
Nos. 501, 502 and 503 Perry-Payne Bldg., CLEVELAND, O.

H. S. LORD. J. H. NORTON.
LORD & NORTON,
Attorneys-at-Law, Proctors and Advocates in Admiralty,
DULUTH, MINN.

White, Johnson & McCaslin,
ATTORNEYS-AT-LAW,
—AND—
Proctors in Admiralty,
26-27 Blackstone Building,
CLEVELAND, - OHIO.

THOS. WILSON,
MANAGING OWNER
WILSON'S TRANSIT LINE.
Gen. Forwarder.
Freight and Vessel Agent.
CLEVELAND, O.

C. F. Palmer. C. L. Hutchinson
PALMER & CO.,
Vessel Agents and Underwriters,
515 Perry-Payne Bldg., Cleveland, Ohio.
Telephone 644.

The M. I. Wilcox
CORDAGE AND SUPPLY CO.
Steamboat, Vessel and Mill Supplies.
STEAM YACHT, "MINNIE D."
210-216 Water Street,
TOLEDO, OHIO.

ORESTES C. PINNEY,
Lawyer and Proctor in Admiralty.
Rooms 722 and 723 Perry-Payne Bldg.
CLEVELAND, OHIO.
Telephone 2585.

C. W. ELPHICKE. JAS. A. MYERS. A. L. FITCH.
C. W. ELPHICKE & CO.
GENERAL INSURANCE AGENTS.
Room 10, No. 6 Sherman St., Chicago, Ill.

H. J. WEBB & CO.
SHIP BROKERS, VESSEL OWNERS and AGENTS,
Established in 1856. H. J. Webb & Co. will charter vessels for the lake trade. Special attention given to chartering vessels in the Lake Superior Iron Ore trade, both for the season and single trip.
☞No. 606 & 607 Perry-Payne Building, Cleveland, O. Office Telephone No. 338, Residence No. 3228.

J. T. ROSE. FRANK B. LAZIER.
ROSE & LAZIER,
Vessel Agents and Brokers, and Marine Insurance,
16 Board of Trade,
DULUTH, - - MINN.

VANDUZEN Steam JET PUMPS
THE BEST IN THE WORLD.
Pumps any kind of Liquid. Always in order. Never clogs nor freezes. Fully Guaranteed. COST $7 AND UPWARD. Especially useful for Mines, Quarries, Pits, Wells, Clay Pits, Breweries, on Steamships, Ferryboats, Sugar Plantations, etc. A full stock always on hand.
Descriptive Catalogue and Prices furnished Free. THE E. W. VAN DUZEN CO., Cincinnati, O.

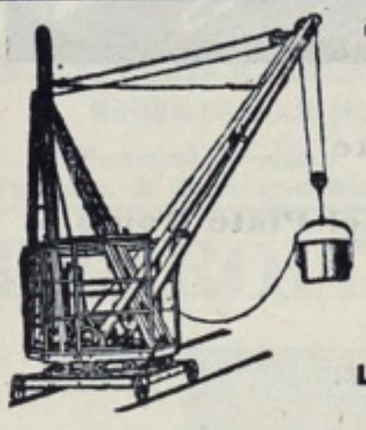
PATENTS
Promptly secured. Trade-Marks, Copyrights and Labels registered. Twenty-five years experience. We report whether patent can be secured or not, free of charge. Our fee not due until patent is allowed. **32 page Book Free.**
H. B. WILLSON & CO., Attorneys at Law, Opp. U. S. Pat. Office. **WASHINGTON, D. C**

Pickands, Mather & Co.,

FUEL LIGHTERS AT BUFFALO, ERIE, ASHTABULA AND CLEVELAND.
At DETOUR, MICH., A FUEL DOCK equipped with Shute capacity of 600 Tons.
Best Quality PITTSBURGH COAL furnished at any time during Day or Night.
Western Reserve Building, CLEVELAND, O.

Ohio & Pennsylvania Coal Co.
FUEL DEPARTMENT.
MINERS AND SHIPPERS,
Youghiogheny and Ohio Steam Coals. Steamboats, Tugs, etc., Coaled day or night, DOCKS FOOT WEST RIVER STREET. WHISKEY ISLAND GOVERNMENT PIER and C. & P. R. R. SLIPS. Also STEAM LIGHTER—Equipped with Revolving Derrick and (100) two ton buckets.
Telephone 1608. Office, 130 West River St., CLEVELAND, OHIO.

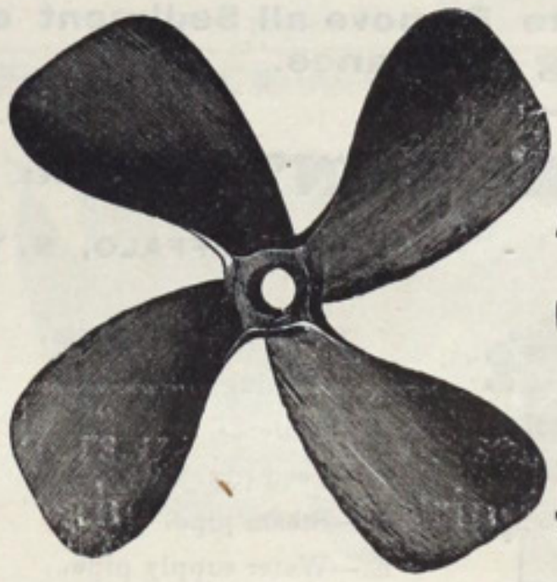
THE PITTSBURGH AND CHICAGO GAS COAL CO.
MINERS AND SHIPPERS OF
Pittsburgh and Youghiogheny Coal.
Fuel Docks West Side of Main River, Cleveland, Ohio, just above Main St. Bridge.
Latest equipment for rapid fueling of Steamers at all hours, day or night.
Fuel Lighter 300 tons capacity; buckets 2½ tons capacity.
Telephone { Office 1888. Fuel Dock 1590. Ore Dock, 2413.
J. A. DONALDSON, Agent, 420-421 Perry-Payne Building.



TOLEDO FUEL CO.,
Cambridge, Hocking, Jackson and Massilon Coal
Wheeled on or put on with DERRICK.
NIGHT OR DAY.
SATISFACTION GUARANTEED.
H. H. WLLIAMS, Manager.
Located on Penn. Dock, TOLEDO O.
GET OUR PRICES. Phone 1441.

H. A. BARR, PRESIDENT, Escanaba. F. H. VAN CLEVE, SEC. Escanaba. CAPT. GEO. BARTLEY, SUPT. Escanaba.
ESCANABA TOWING & WRECKING CO., Escanaba, Mich.
Tugs, Lighters, Steam Pumps, Hawsers, Hydraulic Jacks and Diving Appliances always ready.
TUG MONARCH, { Engine Compound, Cylinder 16 and 30 inches diameter, 30 inch-Stroke, Steam Pressure Allowed, 125 pounds.
TUG DELTA, { Cylinder 20 by 22, Steam Pressure Allowed, 105 pounds.
TUG OWEN, { Cylinder 20 by 20, Steam Pressure Allowed, 104 pounds.
CENTRIFUGAL PUMPS, Seven and Fourteen Inch Suction

H. G. TROUT,
KING IRON WORKS,
BUFFALO, N. Y..
MANUFACTURERS OF
TRIPLE EXPANSION, THREE CYLINDER, FORE AND AFT And STEEPLE COMPOUND MARINE ENGINES,
High and Low Pressure Engines, Sectional. Propeller, Tug and Yacht Wheels,
Cowles Aluminum and Manganese Bronze Propeller Wheels.



These Wheels are noted for their extra speed, towing power and proportionate saving of coal.
PRICES QUOTED ON APPLICATION.

PRIVATE CAR FOR SALE
or Exchange for a Steam Yacht.
—FOR FULL PARTICULARS, ADDRESS—
E. D. BROWN, - 26 River St., - CHICAGO, ILLS.

Buffalo Signal Lamps,

For Steamers and Sailing Vessels.

Patent Fluted Lens and Perfect Colors

GET THE BEST AND AVOID COLLISIONS.

Manufactured by

RUSSELL & WATSON,

Successors to FELTHOUSEN & RUSSELL,

145 Main St. BUFFALO, N. Y.

SEND FOR CATALOGUE.

PINTSCH GAS LIGHTED BUOYS

Adopted by the English, German, French, Russian, Italian, and United States Light House Departments, for channel and harbor lighting; over 500 gas buoys and gas beacons in service.

BURN CONTINUOUSLY from 80 to 365 days and nights without attention, and can be seen a distance of six miles.

Brilliant and steady illumination.
Economical and reliable in operation.

CONTROLLED BY THE

SAFETY CAR HEATING & LIGHTING COMPANY,

160 Broadway, New York City.

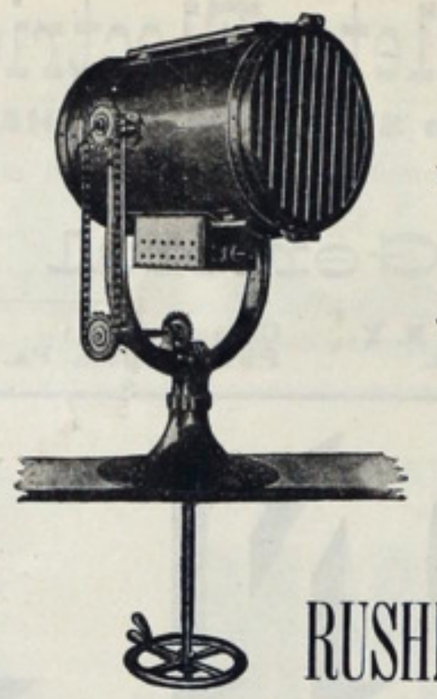
C O A L

STANLEY B SMITH & CO.
OPERATING
SMITH'S COAL DOCK
POCKET FUELING AND LOW DOCK
DETROIT, MICH.
OFFICES: DETROIT MICH.
LORAIN, OHIO.
OPERATING
LORAIN COAL DOCK
LAKE SHIPPERS OF STEAM COAL.
STEAMBOAT FUELING

C O A L

ALL NEW HYDROGRAPHIC CHARTS ARE KEPT IN STOCK BY THE MARINE REVIEW, 516 PERRY-PAYNE BUILDING, CLEVELAND.

CAPTAINS AND MATES ARE INVITED TO CALL AT THE OFFICE OF THE MARINE REVIEW AND LOOK OVER THE CHARTS AND SAILING DIRECTIONS OF LAKES SUPERIOR, MICHIGAN, HURON, ERIE AND ONTARIO, PUBLISHED BY THE HYDROGRAPHIC OFFICE.



Type D. Pilot House.

PROJECTORS!

10 MILLION TO
100 MILLION
CANDLE POWER.

The only successful commerial light.

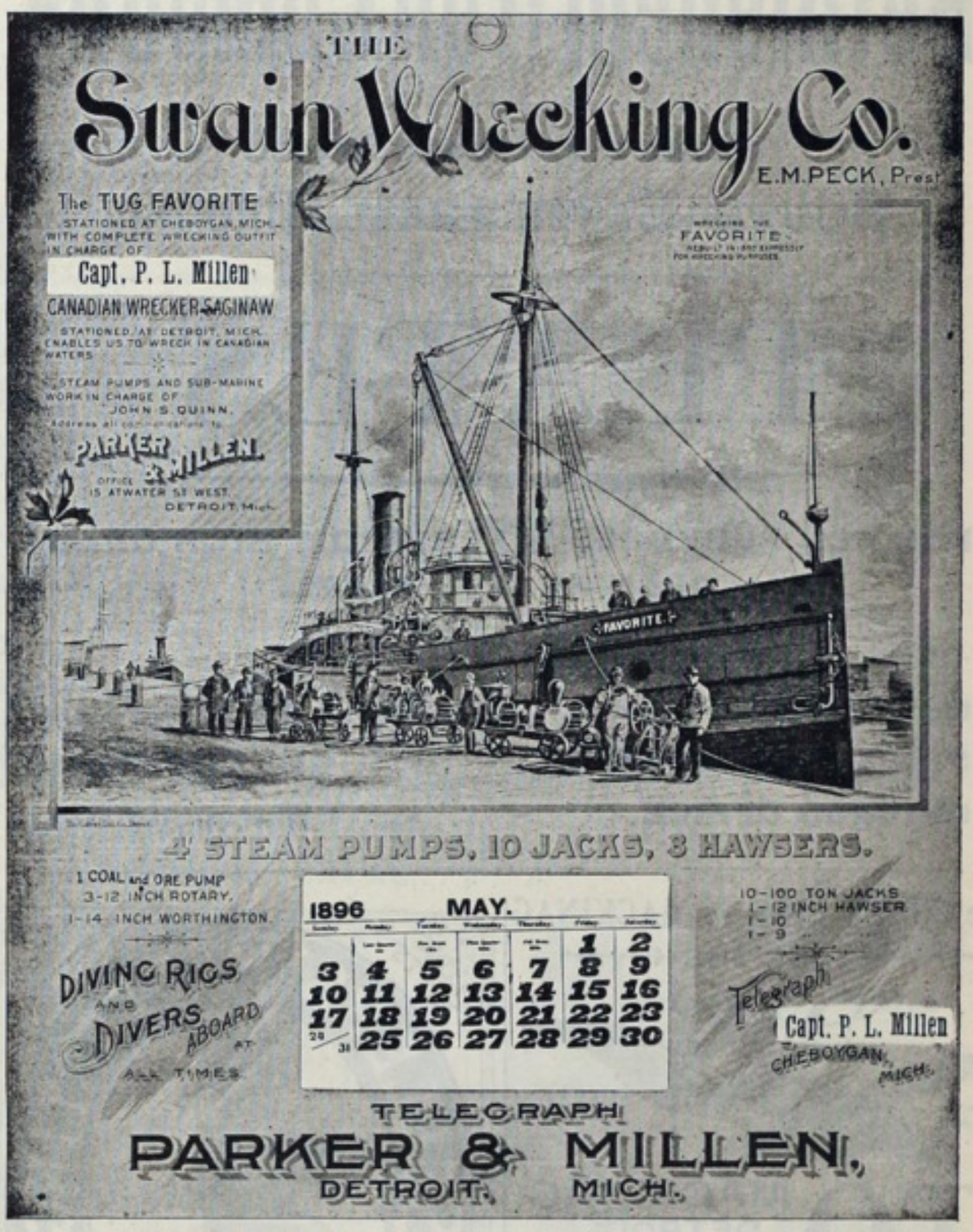
Adopted and endorsed by leading steamship lines and builders.

Have Replaced All Other Makes.

CATALOG NOW READY.

RUSHMORE DYNAMO WORKS,

JERSEY CITY, N. J.



STERLING, WELCH & CO.

12 and 14 Euclid Ave., CLEVELAND, O.

BOAT FURNISHING A SPECIALTY.
CARPETS, OIL CLOTHS,
CURTAINS, &c., &c.
SUPPLIED AT WHOLESALE RATES.

MARINE VALVE OIL FOR INTERNAL LUBRICATION. RENOWN ENGINE OIL FOR EXTERNAL LUBRICATION

STANDARD OIL COMPANY, MARINE VALVE OIL CLEVELAND, O.

Marine Valve, Renown Engine, Eldorado Engine, Crank Case, Victor Signal, Dark Lubricating, Mineral Seal, Head Light, Artic Cup Greases, and Lard Oils.

— CARRIED IN STOCK AT THE —

STANDARD OIL COMPANY'S MARINE DEPOT,

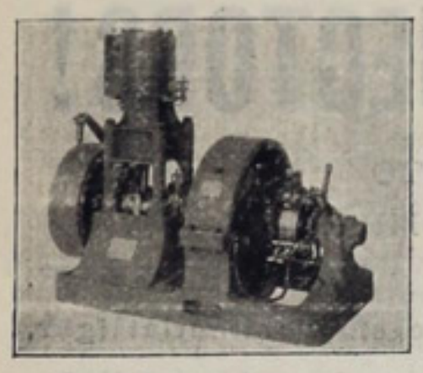
TELEPHONE 77. **123 River Street, CLEVELAND, O.** MAIN OFFICE TELEPHONE 682.

STANDARD OIL COMPANY, RENOWN ENGINE OIL CLEVELAND, OHIO.

ALSO FOR SALE BY **STANDARD OIL COMPANY,**

Chicago, Ill., No. 5 Wabash Ave.
Racine, Wis.
Milwaukee, Wis., Broadway & Mason.
Sheboygan, Wis.
Manitowoc, Wis.
Green Bay, Wis.
Marinette, Wis.
Oshkosh, Wis,
Duluth, Minn,
West Superior, Wis.
Hancock, Mich.
Marquette, Mich.
Buffalo, N. Y.
Sault Ste. Marie, Mich.
West Bay City, Mich., M. C. Ry. & 10th St
Saginaw, Mich., Eighth & Sears Sts.
Detroit, Mich., 46 Jefferson.
Toledo, O., Summit & Monroe Sts.

ATLANTIC REFINING COMPANY, French & 16th Sts., Erie, Pa.
D. ROBESON, Port Huron, Mich.
W. S. MCKINNON, Ashtabula Harbor, O.
HULL & RAND, Huron, O.
EDWARD BRAMMALL, Bnton Harbor, Mich.
BABY & DALE, St. Clair, Mich.
N. C. ALTEN, Lorain, O.
A. F. HARRINGTON, Conneaut Harbor, O.
A. H. MCGONAGIL, South Chicago, Ill.
MARINE SUPPLY CO., Fairport, O.
F. KRANZ, Sandusky, O.
THE M. I. WILCOX CORDAGE & SUPPLY CO., Toledo, O



Complete Electric Plants for Light and Power

On STEAMSHIPS, WHALEBACKS, YACHTS, DOCKS, WHARVES, Etc.

Our system is complete in every detail. All our appliances are made to Governmental and Insurance requirements and are perfect.
Write for prices and catalogues

General Electric Company.

SALES OFFICES

Schenectady, N. Y. Chicago, Ill. Detroit, Mich. Buffalo, N. Y. Columbus, O. New York, N. Y.
Boston, Mass. Philadelphia, Pa. Baltimore, Md. Portland, Ore. San Francisco, Cal.

FRONTIER IRON WORKS

MARINE ENGINES,
DETROIT, MICH.

Bethlehem Iron Company

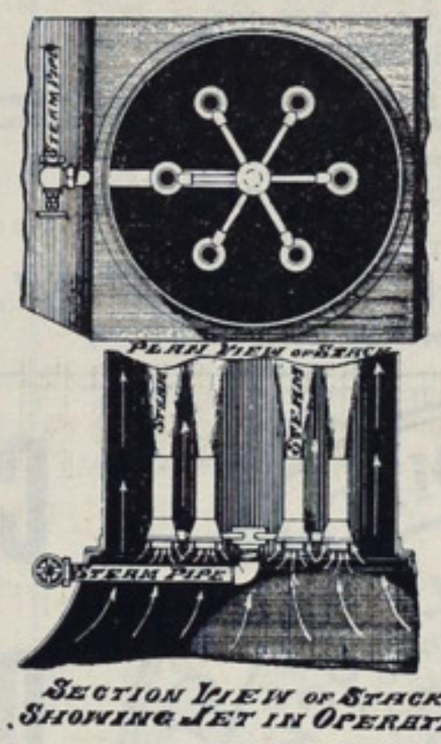
WORKS and PRINCIPAL OFFICE:

SOUTH BETHLEHEM, PENNA.

PLATES

FOR ALL PURPOSES MADE FROM HIGH GRADE OPEN HEARTH STEEL.

NEW YORK OFFICE, - - 100 Broadway.
PHILADELPHIA OFFICE, - 421 Chestnut St.
CHICAGO OFFICE, - - Marquette Bldg.



SECTION VIEW OF STACK SHOWING JET IN OPERATION

H. Bloomsburg & Co.,

Patentees and Manufacturers of

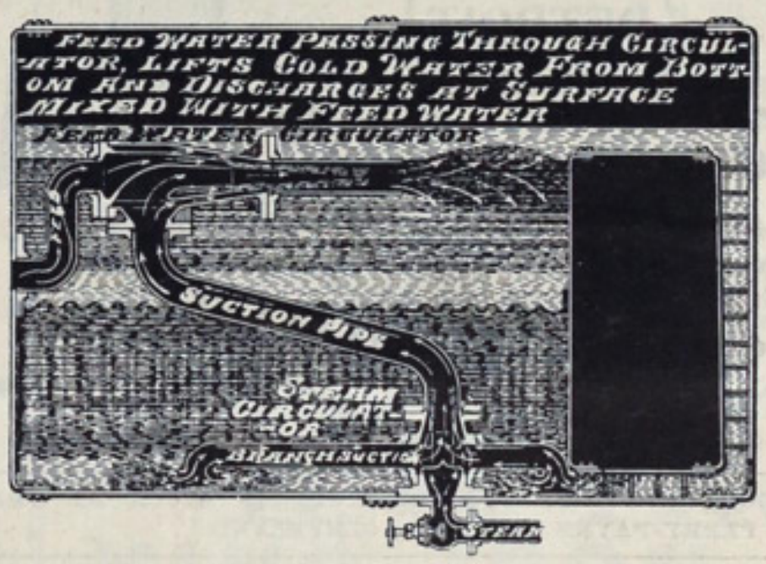
The Equilibrium Circulator & Steam Heating Attachment

For Marine, Locomotive and Stationary Boilers.

Also the ANNULAR JET for INDUCED DRAFT . . . .

Main Office,
NEWPORT NEWS, VA.

Branch Office, 818 Adams St.,
WILMINGTON, DEL.


FEED WATER PASSING THROUGH CIRCULATOR, LIFTS COLD WATER FROM BOTTOM AND DISCHARGES AT SURFACE MIXED WITH FEED WATER
FEED WATER CIRCULATOR
SUCTION PIPE
STEAM CIRCULATOR
BRANCH SUCTION
STEAM

CIRCULATING the water in Steam Boilers . . .

INCREASES steaming capacity.

SAVES coal and reduces cost of repairs

PROLONGS life of boilers.

PREVENTS foaming or priming and pitting.

Now in use on the Ocean Greyhounds and Freight Ships, also the fastest Coasting, Sound, Bay, and River steamers, giving remarkable results. Used by the principal ship yards and boiler works.

The COAST LINE to MACKINAC

TAKE THE

TO MACKINAC DETROIT PETOSKEY CHICAGO

2 New Steel Passenger Steamers

The Greatest Perfection yet attained in Boat Construction—Luxurious Equipment, Artistic Furnishing, Decoration and Efficient Service, insuring the highest degree of

COMFORT, SPEED AND SAFETY.

FOUR TRIPS PER WEEK BETWEEN

Toledo, Detroit & Mackinac

PETOSKEY, "THE SOO," MARQUETTE, AND DULUTH.

LOW RATES to Picturesque Mackinac and Return, including Meals and Berths. From Cleveland, $18; from Toledo, $15; from Detroit, $13.50.

EVERY EVENING

Between Detroit and Cleveland

Connecting at Cleveland with Earliest Trains for all points East, South and Southwest and at Detroit for all points North and Northwest.

Sunday Trips June, July, August and September Only.

EVERY DAY BETWEEN

Cleveland, Put-in-Bay & Toledo

Send for Illustrated Pamphlet. Address

A. A. SCHANTZ, G. P. A., DETROIT, MICH.

The Detroit and Cleveland Steam Nav. Co.

For Stationary, Portable, Traction Engines, Tugboats, &c.

Thoroughly Reliable—Perfectly Automatic.

JENKINS BROS., - Selling Agents,
NEW YORK, BOSTON, PHILA., CHICAGO.

Blue Book of American Shipping

Published by the

MARINE REVIEW,
409 PERRY-PAYNE BUILDING,
CLEVELAND.

Contains over 7,500 names and addresses for circulating purposes, 460 names include owners of 2,400 of the largest lake and ocean vessels. Order now—$5. Money refunded if book is not satisfactory.

FOR SALE at a Bargain.

The tug Henry—Cylinders, 16½x18; new steel boiler; steel boiler house; hull in first-class condition. This is a most favorable opportunity to procure a first-class tug for dredging outfit. For particulars apply to **WILLIAM TRUBY,**

Fairport Harbor, O., where tug can be seen.

The United States Standard Register of Shipping.

Providing the only Standard Classification based on Construction Rules Designed for Lake Vessels.
Classed Vessels Receive the Lowest Rates of Insurance.

SURVEYORS.

SINCLAIR STUART, Surveyor of Iron and Steel Construction and Engineer Surveyor.

.....Surveyor for District comprising Lakes Superior, Michigan and Huron and Lake Erie, as far East as, and including Cleveland, O.

EDWARD GASKIN, Potter Building, Main Street, Buffalo, N. Y., Surveyor for District comprising Lake Ontario and Lake Erie, as far West as, but not including Cleveland, O.

Application for survey of vessels and subscriptions to Register Book will be received by the surveyors or at the office of

The United States Standard Steamship Owners', Builders' & Underwriters' Ass'n, Ltd.
Post Building, 16 and 18 Exchange Place, . NEW YORK.

S. F. HODGE & CO.

MARINE ENGINES,
PROPELLER WHEELS,
DECK HOISTERS,
MARINE REPAIRS.

320 ATWATER STREET,
DETROIT, MICH.

1896
BLUE BOOK OF AMERICAN SHIPPING.....

PUBLISHED BY THE
MARINE REVIEW,
409 Perry-Payne Building,
CLEVELAND, OHIO.

Answers questions arising daily in regard to the management of lake vessels.

It contains Lists of Names—Owners, Captains and Engineers—for Circulating Purposes, any one of which is worth the price of the book, $5.

Money refunded if book is not satisfactory.

BAR IRON — THE BOURNE-FULLER CO. — PIG IRON

CLEVELAND, O.

BOILER RIVETS, BOILER TUBES, IRON PIPE,
BOAT SPIKES,
CLINCH RINGS, &c.

HIGH GRADE MATERIALS FOR VESSEL CONSTRUCTION A SPECIALTY.

SALES AGENTS:
THE CARBON STEEL CO.
MANUFACTURERS OF
OPEN HEARTH STEEL
SHIP, BOILER, BRIDGE AND TANK PLATES, &c., &c.

SALES AGENTS:
THE CAMBRIA IRON CO.
MANUFACTURERS OF
OPEN HEARTH AND BESSEMER STEEL
ANGLES, BARS, CHANNELS, BEAMS, TEES, ZS, &c.

De Grauw, Aymar & Co.,
34-35 South Street,
NEW YORK, N. Y.

Sole Selling Agents in the United States for
TYZACK'S
STOCKLESS ANCHORS
Over 40 of these Anchors on Lake Vessels.

The McIntosh-Huntington Co.,
CLEVELAND, O.
PENBERTHY INJECTORS,
DAVIS PRESSURE REGULATORS,
RAINBOW PACKING,
VALVES AND FITTINGS. VACUUM PACKING.

THE GEO. F. BLAKE MFG. CO.

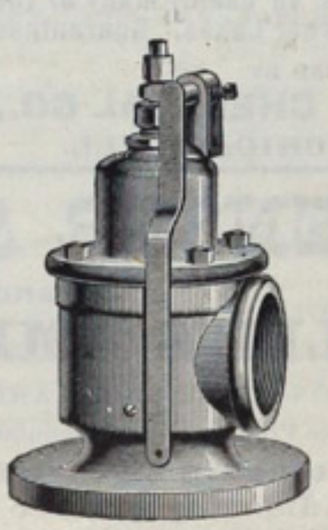
AIR PUMP ON U.S. CRUISER NEW YORK.

BUILDERS OF
MARINE PUMPS
Single and Duplex Pumps for Boiler Feed, Fire or Bilge Service—Vertical and Horizontal.
Vertical and Horizontal Pumps, Air Pumps for Surface and Jet Condensers.

95 and 97 Liberty St., NEW YORK.

STEAMBOAT CAPTAINS, ENGINEERS, CREWS,
BUY RAILROAD TICKETS
READING
Flint & Pere Marquette
R. R.
WHEN GOING TO
SAGINAW BAY CITY,
MANISTEE,
LUDINGTON, MILWAUKEE.
SHORT LINE,
CHEAP RATES.
A. PATRIARCHE, Traffic Mgr.
SAGINAW, MICH.

JOHN DODD,
Sub-Marine Diver.
Headquarters at
St. Ignace and Mackinaw, Mich.



CROSBY STEAM GAGE AND VALVE CO.,
Sole Proprietors and Manufacturers of
Crosby Pop Safety Valves and Water Relief Valves, Crosby Improved Steam Gages, Single Bell Chime Whistles, Patent Gage Testers, Victory Lubricators, and other specialties.
The Crosby Steam Engine Indicator, when required, is furnished with Sargent's Electrical Attachment, by which any number of diagrams can be taken simultaneously.
BRANDEN PUMP VALVES, rubber with wire-coil insertion.
Manufacturers of all kinds of Pressure and Vacuum Gages, Water Gages, Gage Cocks, Radiator Cocks, and other Engine and Boiler Fittings and Supplies.
Branch Offices at New York, Chicago and London,
Main Office and Works at BOSTON, MASS

Bertram's Oil Polish. The Marine Polish of the World.

For Brass and all Metal Surfaces it is unequalled. It is cheaper, requires less work and retains it brilliancy longer than any metal polish made. Acknowledged the standard of excellance by the U.S. government in the marine departments. For sale by ship chandlers and engineers supplies stores. BERTRAM OIL POLISH CO.,220 & 22 State St.,BOSTON,MASS.

WHY BE A FOGY?

GASKETS MADE INSTANTLY WITH

In Boxes 3 to 6 Lbs. each.

3/8 FOR UNIONS,
1/2 FOR HAND HOLES,
5/8 FOR MAN HOLES.

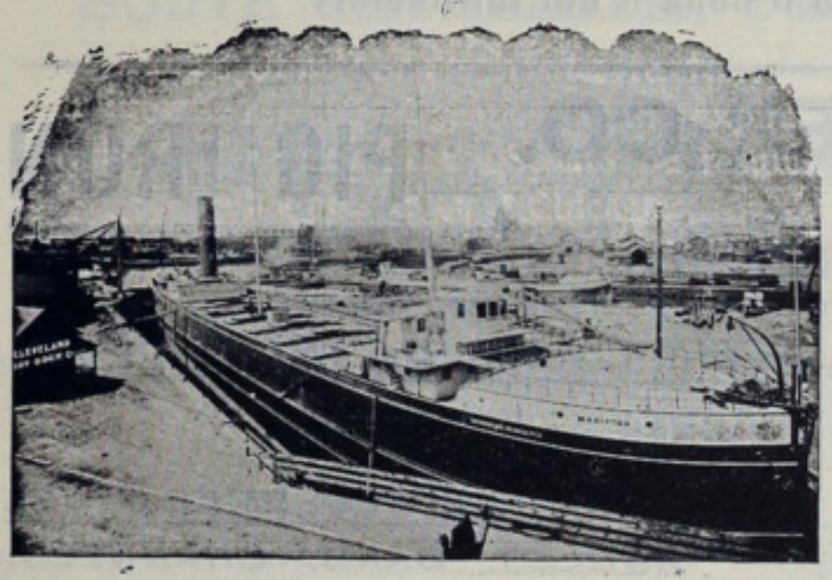
PATENTED AND MANUFACTURED EXCLUSIVELY BY

PEERLESS RUBBER MFG. CO.,

16 WARREN STREET, N.Y.

For Sale by the leading Ship Chandlers and Supply Houses.

The Cleveland Dry Dock Co.



148 Elm St., Cleveland, O.

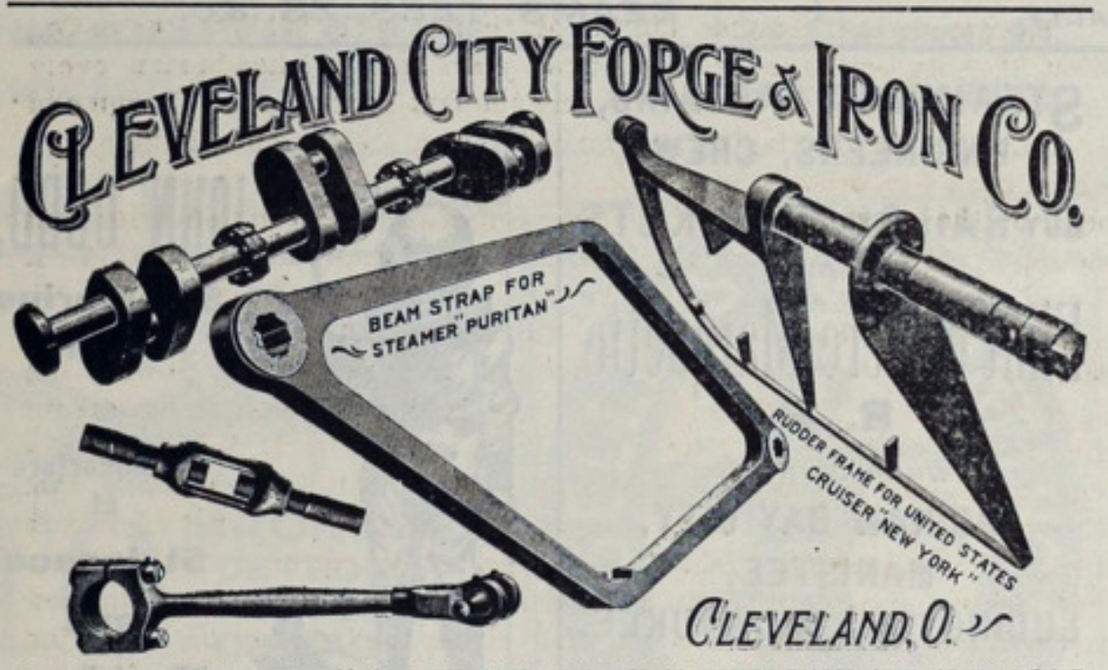
Telephone 1616.
Resid. 'Phone 4080.

REPAIRING A SPECIALTY.

Dimensions of Dock:
Lth. over all, 360 ft.
Lth. on blocks, 340 ft.
Width of gate, 50 ft.
Depth over sill, 20 ft.

Capt. W.W. BROWN
Sec'y & Mgr.

CLEVELAND CITY FORGE & IRON CO.



CLEVELAND, O.

IRON OR STEEL FORGINGS FINISHED COMPLETE, ROUGH MACHINED OR SMOOTH FORGED ONLY, OF ANY WEIGHT.
COUPLING LINKS AND PINS. PRESSED WROUGHT IRON TURNBUCKLES. CAR IRON SPECIALTIES.

ALKALI WATER PURIFIER!

A Pure Chemical for the safe Removal and Prevention of Scale in Steam Boilers. In use by many of the larger Steamship lines on the great Lakes. Guaranteed

MANUFACTURED BY

THE J. H. PARSONS CHEMICAL CO.,
1509 Masonic Temple. CHICAGO. ILL.

H. W. Johns' Boiler and Pipe Coverings.

ASBESTOS MATERIALS OF ALL KINDS.

Wicking, Fibre, Mill Board, Felt, Packing, Cement, Liquid Paints, Roof Paints, Fire-Proof, Paints, etc.

Made in Sections Three Feet Long, to Fit Every Size of Pipe.

ABSOLUTELY FIRE-PROOF.

THE CHASE MACHINE CO. 111 ELM ST. CLEVELAND, O.

H. W. JOHNS MFG. CO 32 SOUTH WATER ST.

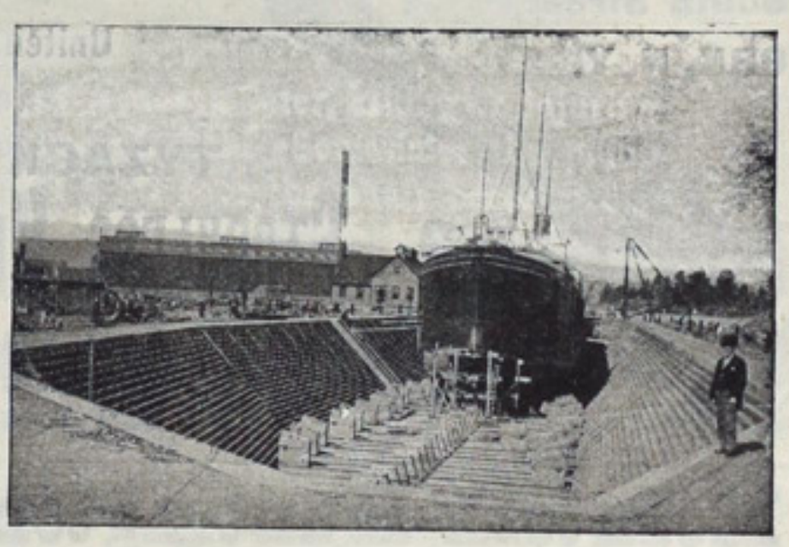
AMERICAN STEEL BARGE CO.

STEEL and METAL SHIPS

Of all classs built on the Shortest Possible Notice at our yards at

West Superior, Wis., and also at Everett, Wash.

Photograph of 300 ft. Boat in Dock.



Plates & Material Always on hand to Repair all kinds of Metal Ships in Shortest Time.

Best Quality of Oak instock for Repairing Wooden Vessels of all Classes.

SIZE OF DOCK.

Length, extreme	537 feet.	Entrance, Top	55 feet 9 in.
Breadth, Top	90 " 4 in.	Entrance, Bottom	50 "
Breadth, Bottom	52 "	Depth over Sills	18 "

LARGEST DRY DOCK ON THE LAKES.

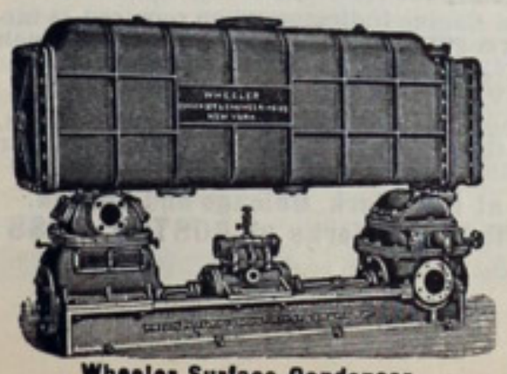
Prices for Repairs and Docking same as at lower lake ports

SUPERIOR, WIS.

A number of Propellor Wheels in stock at Dry Dock.

WHEELER CONDENSER & ENGINEERING COMPANY,

39 and 41 CORTLANDT STREET, NEW YORK.



Wheeler Surface Condenser.
Mounted on Combined Air & Circulating Pumps.

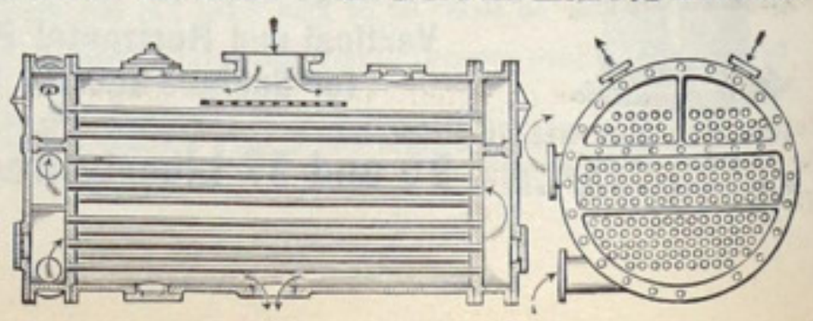
WHEELER'S IMPROVED SURFACE CONDENSERS

MOUNTED UPON COMBINED AIR AND CIRCULATING PUMPS.

Sole Proprietors and Manufacturers of the

Wheeler Standard Surface Condenser.
Wheeler Admiralty Surface Condenser.
Wheeler Lighthall Surface Condenser.
Volz Patent Combined Surface Condenser and Feed Water Heater.

Wheeler's Improved Marine Feed Water Heater.



Patent Combined Surface Condenser & Feed-Water Heater.